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PREVENTION OF SPONTANEOUS AND INDUCED ABORTION*

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NOWADAYS we hear much talk about the conservation of our natural resources, reforestation, soil-preservation, and the control of damage by flood and famine. Not so much thought is given, however, to the even more important problem of conservation of our human resources. It is up to us as physicians to take the leadership in that direction. I know no more glaring example of the failure to practice conservation than in the wastage of human life associated with spontaneous and induced abortion. The avoidance of a pregnancy through contraception may limit production but it does no physical harm. Childbirth involves certain unavoidable risks to both mother and child, but there is the compensation of a new life added to our human resources. Abortion, on the other hand, has all these risks multiplied seven-fold without any of the compensations. With the exception of a small number of therapeutic abortions, it has nothing but liabilities as its sequel: the mother incapacitated, her health undermined at times, with death not an infrequent termination. The prevention of abortion therefore demands our most serious consideration.

Approximately six to seven hundred thousand abortions occur annually in the United States, and probably eight to ten thousand women lose their lives annually as a result of this condition. These estimates give one a conception of the magnitude of the problem. About one-third of these abortions are spontaneous and two-thirds are induced. Elsewhere²⁰ will be found the data, still rather meagre, upon which these figures are

based. I shall confine my remarks solely to the matter of causes and prevention.

Spontaneous Abortion

The more grateful portion of this study, because holding better promise for its relief, is that of spontaneous abortion. Here we have the eager coöperation of the patient and the measures employed are strictly medical, involving tests, examinations and procedures which are entirely within our own scope as physicians, as distinguished from the problem of induced abortion, in which the legislator, the economist and the social worker have an almost equal share of responsibility in preventive measures.

Since 1909 when I first ventured to write a brief monograph²¹ on the "Prevention and Treatment of Abortion," there has been a definite advance in our knowledge of the causes and prevention of spontaneous abortion. At that time almost all abortions were attributed to some physical accident or trauma, and rest in bed together with the hypodermic administration of opiates were the only remedies used to combat the premature interruption of pregnancy. Habitual abortion was attributed to syphilis and patients were routinely placed on anti-luetic treatment. In the past three decades our increasing knowledge of the endocrine secretions and their modification during pregnancy has opened up a whole new field in the study of sterility and early abortion. Although we are far from having solved this problem, certain experimental data and clinical results point to the fact that we are at least on the right track and that the next decade should bring about a considerable reduction

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in the number of spontaneous abortions in those patients who can and will cooperate in carrying out the rather tedious and expensive method of treatment at present available.

Certain fundamental facts regarding the predisposing factors in spontaneous abortion have always been recognized. The general physical condition of the mother, more especially the condition of the uterus, in which the impregnated ovum was implanted, should be as near to normal as possible. Not infrequently pregnancy continues in spite of marked pelvic disease, but certainly the incidence of abortion in these cases is far in excess of the average. It has therefore been our aim to put the uterus in as normal a condition as possible.

Physical factors predisposing to abortion are: (1) retroversion; (2) fibroid tumors; (3) septate or infantile development; (4) deep lacerations of the cervix; (5) endometrial hyperplasia.

Since these causes have in the past been fully discussed, they will be considered only briefly in this paper. A considerable majority of retroverted uteri will rise out of the pelvis as pregnancy advances without complication. Nevertheless, gentle methods of bringing the uterus forward and holding it there with a pessary decrease uterine irritability and the chance of abortion. Gentleness is essential, however, since brusque manipulations predispose to interruption of the pregnancy. In the presence of fibroid tumors a decision will often be difficult, since pregnancy is ordinarily not interrupted. Where abortion has occurred without other apparent reason, it will usually be wise to do a myomectomy before allowing another pregnancy to take place. Septate and infantile uteri present physical conditions limiting the proper stretching of the uterine cavity. In the former, surgical excision of the septum is advisable. The infantile uterus may require no further treatment, since the pregnancy, even though terminating in abortion, has usually so dilated the cavity that a subsequent gestation is readily carried to term. Deep lacerations of the cervix may tend to abortion by predisposing to dislodgment of the lower pole of the ovisac, to decidual hemorrhage and decidual infection. They should in certain cases be repaired preceding a further conception. Endometrial hyperplasia, often a sequel of post-abortive endometritis, may lead to renewed abortion if not corrected by a curettement. It can

result in faulty implantation of the ovum and so to fetal death.

Turning now from pelvic disorders to systemic infections as factors in abortion, two deserve special attention: (1) focal infections; (2) syphilis.

Curtis,⁸ Reith¹⁷ and others have demonstrated the occurrence of abortion in women who have a focus of infection, especially about the teeth or tonsils. Certain strains of streptococci, both in animals and humans, apparently predispose to decidual infection and abortion. Elimination of points of infection before the occurrence of the next pregnancy is therefore advisable. It would also be logical to give sulphanilamide in such cases, though I know of no reports in which this has been tried.

Syphilis is relatively simple of recognition and control, even though it is generally recognized that in the white race it rarely produces fetal death and interruption of pregnancy previous to the fifth month. In every case of abortion, however, it is wise to do a Wassermann test on husband and wife, and, if positive, institute specific treatment. McCord^{18, 19} has shown that in the negro the virulence of syphilis may cause fetal death and abortion even in the first half of pregnancy.

It has been customary in the past to distinguish between maternal and ovular causes of abortion. In my recent book I still clung to this classification. The more we appreciate the close relationship between the endocrine secretions on the one hand, and the development of the ovum, its impregnation and implantation, and the associated irritability of the pregnant uterus on the other hand, the less does such a separation seem logical. The careful study of abortion ova, begun forty years ago by Mall²¹ at the Carnegie Institute of Embryology at Baltimore and since then carried out in many other places, has brought convincing evidence of the importance of arrested development in the production of abortion. In fact I do not believe it an exaggeration to say that in two-thirds of spontaneous abortions such an abnormality of the hormonal secretions is the fundamental contributing cause. We have for a long time been skeptical about the stories of falls, strains, blows and other forms of trauma to which abortion has been attributed, since these injuries are relatively frequent during pregnancy and only in certain individuals seem to be

attended by an expulsion of the ovisac. Sexual intercourse in the first trimester of pregnancy seems more definitely a contributing factor in abortion, but here it is plausible to assume that the physical contact may be less important than the associated stimulation of hormonal activities.

I shall consider the subject of endocrine pathology under three heads:

1. Preconceptional conditions influencing the development of the sex cells (ovum and sperm).
2. Developmental factors influencing the implantation and the nutrition of the ovum in the first trimester of pregnancy.
3. Hyperirritability of the uterine muscle, due directly or indirectly to an improper balance of endocrine secretions.

Preconceptional conditions.—It has long been noted by veterinarians and those engaged in animal experimentation that low fertility is usually attended by a high abortion rate. The bull with abnormal spermatozoa will produce a high percentage of abortions in his herd. The ovum is also frequently at fault, so that, if impregnated, its development will not progress beyond the stage of a primitive egg-mass. There is good reason to believe that many such abortions in women are not recognized but pass as an abnormal menstruation, since they do not materially disturb her physical condition. The more carefully we examine every extruded ovum in spontaneous abortions, the more we are impressed with the frequency of these so-called "blank cartridges," an unruptured amniotic sac in which no trace of embryo is longer visible. Occasionally a little nubbin of tissue will show a degenerated embryonal cell-mass. Such primarily blighted ova are frequently associated with relative sterility of the couple. Kane⁶ found that of thirty-six children born to forty mothers who had previously habitually aborted, three showed malformations, and concludes: "It may be that preventing the expulsion of abnormal fetuses in the early months of pregnancy is combating nature's provision for the elimination of the unfit."

Unfortunately our knowledge of endocrine diagnosis and treatment is still in its infancy. We must grasp at straws in our preventive measures. The quantitative tests for estrogenic substance are not suitable for routine laboratory work. The basal metabolism test is our mainstay in

this work. If such a test indicates a hypothyroid condition in either husband or wife, it has been found that thyroid extract in moderate doses contributes both to increased fertility and to a more healthy ovum and sperm, so that the resulting impregnation is less apt to be followed by an abortion. Even with a relatively normal basal rate, it would seem that the pre-conceptional ingestion of small amounts of thyroid does no harm and may be of benefit.

Occasionally there have been observed mated couples, who are sterile or have repeated abortions. In subsequent marriages both husband and wife may have healthy offspring. Tranquilli-Leali²² has ascribed such a condition to incompatible blood groups. In thirty-eight of forty-one cases of habitual abortion he found husband and wife belonging to different blood groups. Further observations are required before we can definitely accept this hypothesis as true.

A routine careful examination of the spermatid fluid constitutes the most important point in preconceptional diagnosis and treatment. If this shows faulty morphology and motility, all possibly contributing causes, such as prostatic infection or endocrine disorders, should be corrected before allowing conception again to take place.

Developmental factors influencing the implantation and nutrition of the ovum, center largely around the proper functioning of the corpus luteum of pregnancy. Removal or destruction of this portion of the ovary shortly after conception invariably results in abortion, as proven by animal experimentation. Unfortunately we have as yet no quantitative physiologic test for the hormone produced by the corpus luteum, hence both our diagnosis and treatment must be largely empiric. We know that the corpus luteum has a sedative effect on the uterine muscle just as anterior pituitary and estrogenic extracts have a stimulating effect. Consequently in cases of abortion not explainable on any other basis we assume a deficiency of corpus luteum or excess of estrogenic or anterior pituitary hormone. It seems fairly certain in any event both by animal experimentation and clinical experience that the injection of large amounts of progesterone (luteinizing hormone) in the early months of pregnancy does no harm and in a surprisingly

large percentage definitely inhibits the tendency to abortion. Novak¹³ rightly calls attention to the cases in which sedatives and rest without further medication prevent abortion, but in the forty-one cases of habitual abortion treated by Falls, Lachner and Krohn⁸ the patients were up and around and received only progesterone with successful continuation of pregnancy to term in thirty-four cases. In Kane's series of forty cases of habitual abortion thirty-six were carried to term by the use of progesterone, but in this series thyroid extract was also given.

Whether this favorable effect of progesterone is primarily due to the prevention of an insufficient decidual reaction predisposing to faulty implantation or whether it is the countervailing in women who produce an excess of estrogenic or pituitary hormones remains at present unsolved.

In similar fashion we have abundant clinical evidence of the favorable effect of thyroid extract in preventing abortion, but we do not know in what way it acts. Many of these patients have a low basal metabolic rate. Werbatus,²⁵ treating twenty-four cases of habitual abortion with thyroid extract alone, reports only one failure. Aza¹ also speaks of good results with this treatment, and Litzberg² stresses the value of thyroid extract in the treatment of sterility and abortion.

The interdependence of metabolic processes and the internal secretions is at no time more evident than during pregnancy and plays an important part in the etiology of abortion. E. C. P. Williams²⁶ has called attention to the frequency of low sugar tolerance in women who habitually aborted and found that by proper dietary control with or without insulin the incidence of abortion could be reduced. Vogt-Möller²³ and more recently Shute¹⁹ have stressed the importance of a diet rich in Vitamin E. Vogt-Möller found a very low cholesterolemia present in habitual abortion and found that the administration of Vitamin E, in the form of wheat germ oil, corrected this condition and resulted in fifty-seven out of seventy-four cases being carried to term. Shute found that in many cases of spontaneous abortion the blood serum was resistant to tryptic proteolysis. This condition of the blood serum could be produced in rats by putting them on a diet devoid of Vitamin E. Hence he gives this vitamin in large amounts to patient having repeated abortions and found that the proteolyt-

ic reaction of the blood became normal and the pregnancy was carried to term. Shute believes that Vitamin E is one of the factors in the body that holds estrogenic substance in equilibrium during normal pregnancy.

The ingestion of large amounts of Vitamin C in the form of cantan has been advised by W. Schmidt,¹⁸ since it has been claimed that this vitamin improves the function of the corpus luteum. He believes that in this way the tendency to abortion is reduced. Some writers stress the significance of calcium deficiency as a factor in abortion.

Hyperirritability of the uterine muscle, due directly or indirectly to improper balance of the endocrine secretions, has already been touched upon in the preceding paragraphs. Whether in these cases we are dealing with an excessive amount of estrogenic or pituitary hormones or an insufficient quantity of corpus luteum hormone it is difficult to say. In all events the hyperirritable uterine muscle under these circumstances, if subjected to any form of physical or psychic excitation, begins to undergo rhythmic contractions that loosen and finally detach the placenta from its point of implantation, thus leading to an abortion. This cycle may occur at any time in the first two trimesters of pregnancy but is more apt to occur at the time of the expected menstrual period. At approximately four weeks intervals following the last menstruation there still persists a menstrual-like wave, at which time the uterus is more irritable and abortion more apt to occur. Exciting factors leading to abortion in such a hyperirritable uterus may be some physical strain or trauma, sexual intercourse, nervous exhaustion or mental shock. In some cases the period of greatest danger from abortion for some reason may be as late as the fourth or fifth month of gestation, hence it is advisable to continue the hormonal administration up to the period of viability of the child.

Summary of preventive treatment.—While for purposes of investigation it is better not to combine different therapeutic agents, since the specific effect of any one of them is thereby left in doubt, we are inclined in practice to recommend the use of all means that have any proven value.

As the first step, however, a careful review of all factors that may have led to previous abortions is desirable. Careful examination of the

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abortion products often point to the cause. The absence of an embryo, evidence of a missed abortion (one retained a month or more after fetal death), or an imperfectly developed decidua layer, point to endocrine factors. Basal metabolism tests, the determination of sugar tolerance, and Wassermann reactions on both husband and wife give additional information. Pelvic examination reveals the presence of fibroids, retroversion and deep cervical tears. A careful check of the husband's spermatic fluid must be made. All these are included under the head of pre-conceptional diagnosis and appropriate corrective treatment is instituted.

After conception we would still hold to a maximum of rest and sedative, particularly at the time of the expected menstrual wave. How far to go in this direction is a matter of individual choice, but certainly in the presence of bleeding or cramps, indicating a threatened abortion, absolute bedrest is essential. More debatable is the value of opiates under such circumstances. There is considerable evidence, as recently shown in the experiments of Falls, Lachner and Krohn,⁵ that morphine in ordinary doses may stimulate rather than inhibit uterine contractions. If morphine is used at all, not less than one-third grain hypodermically should be given. Recently I have been more inclined to use barbiturates, since the combination of bedrest and opiates leads to constipation that in turn promotes intestinal, and hence uterine, peristalsis. Whenever possible, a case of threatened abortion should be handled in a hospital where absolute rest can be secured, away from the petty annoyances of the home.

And now a few words more about the technic of endocrine treatment. Unfortunately the manufacture and standardization of progesterone is an expensive process and we are faced by the practical problem of meeting the drug bills. If it is true, as claimed by Bishop Cook and Hampson,² that less than thirty rabbit units are probably insufficient, it means that the use of this product alone will cost not less than \$30. Pratt^{1a} believes that the human female does not require as large an amount of progesterone as the rabbit to inhibit abortion. Kane⁶ prescribes 1/25 rat unit of proluton every other day for ten doses, a series that is repeated every three weeks up to the end of the fourth month. Falls, Lachner and Krohn⁵ give one rabbit unit twice daily in threatened abortion and prophylactically twice a week

up to the thirty-second week. My own experience would favor the use of the larger amounts.

There seems to be no contraindication to using thyroid extract in combination with some preparation of progesterone. The dosage employed by Werbatus²⁵ seems unduly high. He recommends one and a half grains three times daily up to four and a half months, and two grains three times daily thereafter up to the eighth month. I should feel it safer to use only one-half grain three times daily as suggested by Kane except in cases with persistent low basal rates. On the other hand some patients may require iodides to reduce thyroid activity. Thirty years ago habitual abortion was routinely treated by the administration of iodides and the occasional successes explained on the basis of a latent syphilis.

Vitamin therapy if carried out to the point recommended by Vogt-Möller, Shute and other enthusiasts is also very expensive. The wheat germ oil, used in Vitamin E treatment, must be given in large amounts. Shute uses 24 grains of such a preparation in the first twenty-four hours to produce the proper proteolytic reaction of the blood serum and four grains daily thereafter for the following months to keep it in that condition and so prevent abortion.

To summarize, then, in cases of spontaneous abortion, not due to lues, focal infection or gynecologic disease, I would employ a combination of progesterone, thyroid, Vitamin E, rest and sedatives. There is good reason to believe that such a combination, if carried out consistently for the first six months of gestation, will prevent almost every abortion except where there exists a primary defective germ-plasm.

Induced Abortion

We turn now to a consideration of the induced abortions and separate the legally from the illegally interrupted cases. In cases of hyperemesis, tuberculosis and certain forms of heart disease, therapeutic or legal abortion is resorted to less frequently than formerly, since our treatment of these conditions during pregnancy has shown material progress. The administration of intravenous glucose in hyperemesis has greatly reduced the number of serious toxemias that formerly required intervention. In tuberculosis the establishment of sanatorium treatment for pregnant women has lessened complications necessitating abortion. Fewer cases of

heart disease are interrupted nowadays, since the prevention of decompensation is better understood. On the other hand we have realized during these decades that in an increasing number of cases of mental and nervous diseases, of moral irresponsibility and of marked physical depletion, a therapeutic abortion may be advisable to conserve the best interests of the family as a whole both from a health and eugenic standpoint. In most of these cases, while there may be argument as to the legal right to interrupt the pregnancy, there is no question as to the desirability of preventing conception. The incidence of therapeutically induced abortion can be reduced to a minimum by widespread carefully supervised instruction in contraception and by prompt sterilization of the individual where this is definitely indicated.

The illegally induced abortions, greatest in number, present our most difficult problem. Here again we must turn to a thorough study of underlying contributory factors to get some clew as to the best methods of prevention. In few countries outside of Russia has any attempt been made to analyze these causes, and Russian conditions are so different from our own that little assistance is gained from studying their reports. From a large series of thousands of women questioned in the abortion clinics of Russia as to the reason for desiring interruption of pregnancy the following report²⁰ may serve as a fair cross-section: poverty, 44 per cent; illegitimacy, 11 per cent; too many children, 12 per cent; unhappy married life, 9 per cent; fear of confinement, 4 per cent; medical reasons, 13 per cent; other reasons, 7 per cent. Poverty and large families, therefore, account for over half of the cases.

A clinical and social study of abortion was recently made by H. S. Pasmore²⁴ analyzing 117 criminal abortions that came to St. Mary Abbot's Hospital, London. Unfortunately methods of induction employed and the use of contraceptives in these cases are given more attention than analysis of the reasons for desiring the abortion. He found that religion apparently played no part, for the proportion of Catholics in this series was identical with the average for the population in that district. Abortion was relatively more frequent among illegitimate mothers. Another interesting study, published this year by R. Pearl,²⁵ deals with fertility and contraception among 7,500 white and negro

women in New York and Chicago. One out of eight of these women had at least one induced abortion. They were "deliberately causing from 1/6 to more than 1/5 of their aggregate reproductive wastage by the dangerous expedient of induced abortion." Pearl stresses the fact that these abortions occurred twice as frequently among those women who practiced contraception than among those that did not, and adds the comment: "The abortionist is called on to rectify the inadequacies of birth control." Her report does not, however, justify the assumption that the practice of birth control leads to the practice of induced abortion, since it is self-evident that women who were anxious at all costs to avoid having another child would almost without exception practice some form of birth control, and conversely that women who do not practice birth control usually accept with resignation the occurrence of a pregnancy and less frequently resort to abortion.

In Dr. Kopp's⁷ analysis of 11,172 abortions in New York City, the number of induced cases increased directly with the number of children in the family. As evidence of increasing poverty in these larger families she noted that more of them were done by midwives, or were self-induced. The 1934 Children's Bureau report on maternal mortality²⁴ pointed out that although abortion was relatively more frequent among unmarried mothers (one in three as compared with one in five), 90 per cent of all who died from abortion were married women.

The causes of induced abortion may then be summarized as due to: Poverty; large families; domestic troubles; illegitimacy; and selfishness.

It would be a Utopian dream to attempt to eliminate all these evils. All we can hope for is to reduce their extent to some degree. Poverty will be with us for centuries to come, but even the poorest countries, such as Russia, have in recent years taken steps to provide free hospital care and medical service for expectant mothers so as to lessen the hardship of childbearing. Surely it is the function of the state to provide maternal and child welfare and when such a program is carried out on a nation-wide scale it should materially reduce the temptation to resort to abortion. In addition, when the family gets beyond the three or four for whom the average parents can provide proper sustenance, our efforts should be directed along the line of

contraceptive education. We have only in the last two decades begun scientific research as to more certain and simpler methods of contraception and it seems not unlikely that these efforts will in the coming generation be rewarded by the discovery of measures that even the most dull-witted couple can employ with safety. When we have thus learned to limit the size of the family, the necessity for induced abortion should be reduced to a minimum.

Domestic troubles are largely dependent on poverty and too many children. When expectant mothers are deserted, the state should render financial and medical assistance if conditions require it. I do not wish to infer that the state should assume the full burden, but at any rate some help should be rendered to lessen the temptation to do away with the pregnancy.

The desire of the unmarried mother to induce an abortion is largely dependent upon our social code. How far this code should be modified to lessen the social ostracism now existing is for the coming generation to decide. If these foolish or unfortunate women were given a fair chance to earn a living for themselves and their child, more mothers would be inclined to carry on with their gestation and thus avoid the serious risks entailed upon instrumental interference.

Finally there is a large group of women who resort to induced abortions for no good reason except their personal convenience. Selfishness is an inherent trait in many of these women. The best corrective in these cases is to prove to them that for selfish reasons they would do better to carry their pregnancy to term. What these women do not appreciate is that every abortion carries with it a greater physical risk than a confinement, that the death-rate is seven times as great and that the resulting ill-health is probably ten to fifteen times as great. I am constantly impressed in private practice with the dense ignorance of intelligent women on this subject. Ten minutes of careful explanation will often make them change their plans and I know of no patients who are afterwards more grateful to their doctor for having saved them from taking such a false step.

I have left for the last the discussion of legal measures to control induced abortion. Since time immemorial the world has tried to limit this evil by punitive measures and utterly failed to ac-

complish anything except to increase the incidence of secret and more dangerous methods of interrupting pregnancy. I do not wish to infer that abortion should be legalized but I am convinced that punitive measures are a last resort and should be primarily directed against those individuals who make a profitable business out of its practice, those professional abortionists who through subterranean channels and paid agents induce women to resort to it as the easy way out. I notice that here in the State of Minnesota¹² you have recently caused the imprisonment of two midwife abortionists. As in other forms of crime, punishment of the criminal may be necessary but it is far less effective in producing results than a study of the cause of such crimes and their correction.

I am convinced therefore that the best results in reducing the incidence of criminal abortion can be obtained by:

1. More generous provision for the economic support and medical care of the expectant mothers among the poor.
2. Widespread information, especially among the poor, regarding the contraceptive methods that are at present available.
3. Intensive scientific investigation to discover safer and simpler methods of contraceptive practice.
4. An open discussion of this subject by both laity and profession so that the inherent dangers to life and health of the mother through induced abortion will be fully appreciated. Only in this way will the public appreciate the importance of preventing the decimating of the lives of expectant mothers and take the necessary steps for more effective control of the problem.

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POLIOMYELITIS IN MINNESOTA IN 1937*

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ACCOUNTS of poliomyelitis occurring in Minnesota are available for many years. During the thirty-year period from 1908 to 1938 there have been 7,927 reported cases of the disease in the State. The statistical history of poliomyelitis is punctuated by a considerable fluctuation in the year by year incidence of the disease, but, however variable, in no twelve-month period has the

abrupt increase over the thirty-seven cases reported for 1936, this number is not significantly above the average yearly expected level. It would appear (Table I) that the disease has not been very active in recent years.

Although the term is not well defined, there has been nothing in the nature of an epidemic in Minnesota since the year 1931. An aggregate of

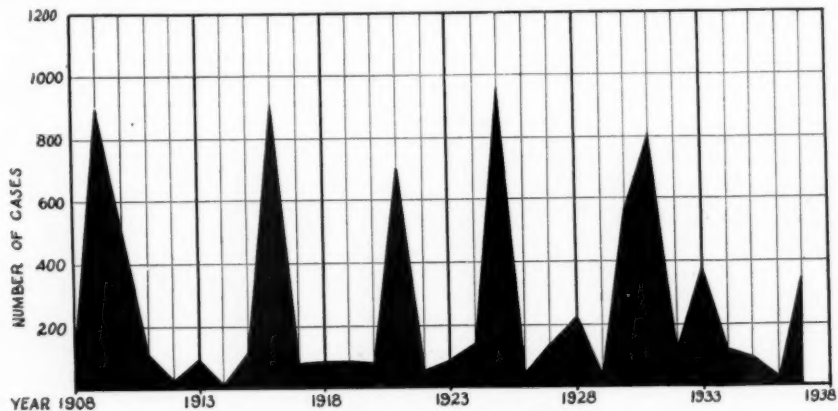


Fig. 1. Reported cases by years (1908-1938).

disease failed to make its appearance. An inspection of the charted course of poliomyelitis in Minnesota during the past thirty years (Fig. 1) indicates that there is a fairly sustained expected annual level of appearance of the disease, but that significant increases in incidence appear at fairly regular intervals.

The year 1937, with 354 reported cases, cannot be considered as unusual. Although a rather

the cases by ten-year periods (Table II), however, gives no indication that the disease shows any tendency toward spontaneous recession.

There have occurred 1,421 deaths attributable to poliomyelitis in Minnesota during this thirty-year period. This is an average mortality rate of 17.9 per cent. Although great advances have been made in medicine during this time, very little has actually proven of benefit either in the prevention or treatment of poliomyelitis. By ten-year periods (Table II) there has apparently been a significant decrease in the mortality rate of the

*The figures used were obtained from the Division of Preventable Diseases of the Minnesota Department of Health, through the courtesy of Dr. Orianna McDaniel, Director of the Division, and her staff. The paper does not represent any official report of the Department.

POLIOMYELITIS IN MINNESOTA—POHL

TABLE I. CASES AND MORTALITY BY YEARS

Year	Cases	Deaths	Mortality
1908	150	9	6.0%
1909	900	234	26.0%
1910	481	201	41.8%
1911	115	58	50.4%
1912	35	23	65.7%
1913	85	30	35.3%
1914	22	8	36.3%
1915	123	26	21.0%
1916	912	105	11.5%
1917	75	10	13.3%
1918	82	22	26.8%
1919	85	16	18.8%
1920	80	18	22.5%
1921	702	102	14.5%
1922	55	20	36.4%
1923	82	17	20.7%
1924	144	30	20.8%
1925	955	145	15.2%
1926	46	15	32.6%
1927	139	36	26.0%
1928	224	57	25.4%
1929	32	6	18.7%
1930	479	37	7.7%
1931	811	66	8.1%
1932	124	10	8.1%
1933	383	37	9.1%
1934	113	21	18.5%
1935	99	10	10.1%
1936	37	4	10.8%
1937	354	48	13.5%
Total	7927	1421	17.9%

of poliomyelitis made twenty-five or thirty years ago. It is only comparatively recently that the technic of examination of the spinal fluid has reached a stage of refinement where an unquestioned diagnosis can be ascertained. In 1937, there were forty-eight deaths, a mortality rate of 13.5 per cent. This is slightly above the average rate for the ten-year period which the year concludes.

TABLE II. MORTALITY BY TEN YEAR PERIODS

Year	Cases	Deaths	Mortality
1908-18	2898	704	24.3%
1918-28	2370	421	17.8%
1928-38	2659	296	11.1%
Total	7927	1421	17.9%

TABLE III. CASES BY MONTH BY ONSET OF SYMPTOMS, 1937

Month	Jan.	Feb.	Mar.	Apr.	May	June
Cases	3	1	1	1	0	1
Month	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cases	13	64	173	71	18	8

The year 1937 demonstrated strikingly one of the typical features of the disease, marked seasonal variation of incidence (Fig. 2). Throughout the entire first half of the year only seven scattered cases were reported. In July there began an abrupt increase which mounted to almost epidemic proportions through August and reached its peak in mid-September. The four months of July, August, September and October accounted for 321, or approximately 91 per cent of the total 354 cases for the year. About half of the total number of cases for the year appeared in the single month of September.

The disease was proceeding with considerable acceleration in 1937 when the schools opened on September 7. This incident was attended by no noticeable increase in the rate of appearance of new cases which might be anticipated as a result of the segregation of large numbers of potentially infected children. On the contrary the apparent epidemic reached its peak within the week thereafter, and each succeeding week saw a

disease. This might offer some hope that there is a tendency either toward a decreasing virulence of the causative agent or an increasing toleration by the host. It must be kept in mind, however, that these are only statistics. Considerable doubt must arise in regard to the diagnosis

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progressive diminution in the number of new cases being reported. A few cases, however, continued to appear up to the close of the year (Table III).

peak of incidence appeared at approximately six years of age (Figure 3). By sex there was a preponderance of males, being 213 to 141 females.

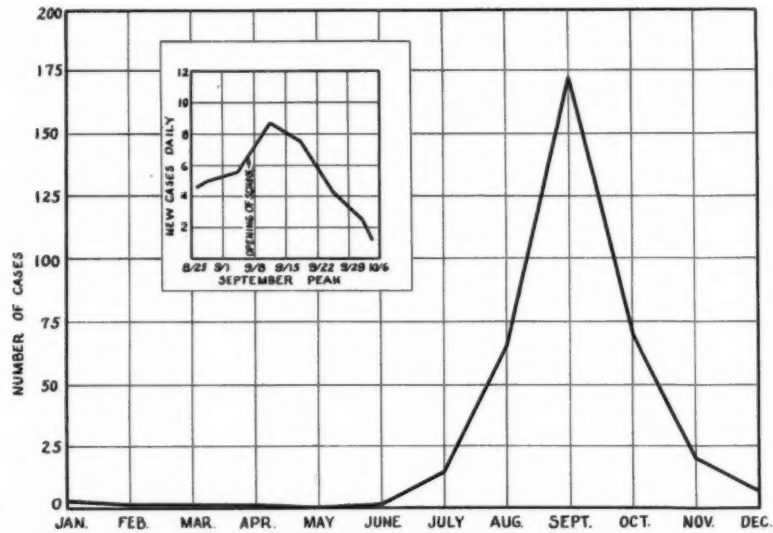


Fig. 2. Cases by month, by onset of symptoms (1937).

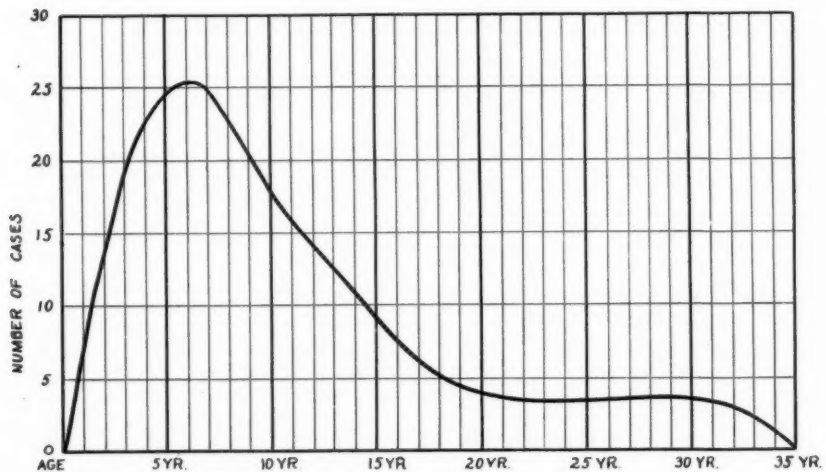


Fig. 3. Occurrence of poliomyelitis by ages (1937).

The majority of the individuals attacked in 1937 were between two and fifteen years of age, but there were victims in every year of life from birth to thirty-five. Three cases were reported in persons forty-four, forty-five and forty-eight years of age, respectively. The youngest child was six months of age, and there were three children under one year of age affected. The

Tolerance of the infection varies considerably at different age levels (Table IV). The general mortality for 1937 was 13.5 per cent. Death did not claim any of the three infants under one year of age nor any of the three over thirty-five. The period of life between the ages of twenty and twenty-five appears to be the most vulnerable, having had, in 1937, a mortality rate of 31.6

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per cent. No tabulation was made of the extent of paralysis at the different age levels.

Geographically, the cases in 1937 were fairly scattered in distribution, being reported from

seven were of the abortive type, compared with only ten cases of the abortive type appearing in the 165 cases occurring throughout the State at large. It is logical to assume that more suspected

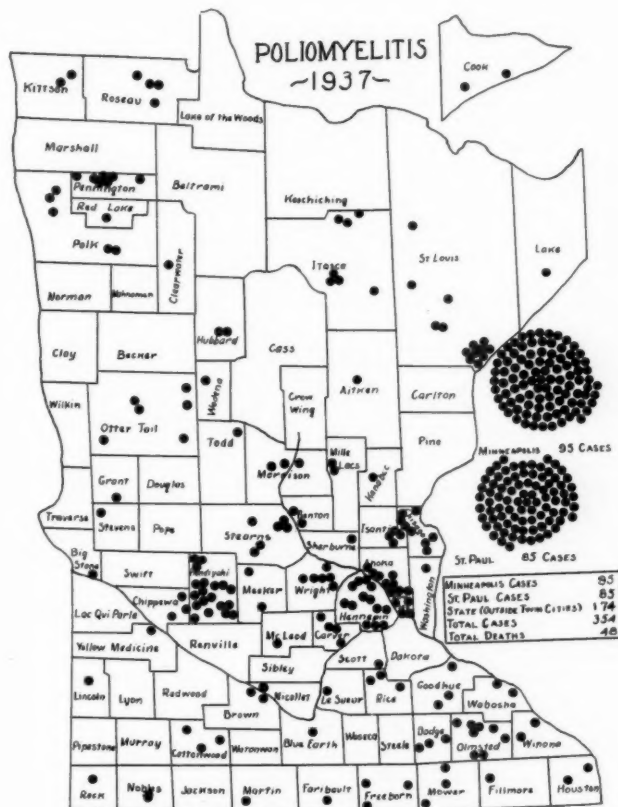


Fig. 4. Location of cases occurring in 1937.

fifty-six of the eighty-seven counties of the state (Fig. 4). The metropolitan districts of Minneapolis and Saint Paul, with a centralization of population, accounted for a good share of the cases. There were in addition minor centers of infection in other parts of the state, the principal one being in Kandiyohi County, from which twenty cases were reported.

The population of Minnesota (estimated 1934) is 2,602,000 people. The three largest cities, Minneapolis, Saint Paul and Duluth, comprise 32 per cent of the total population of the state. It appears that 189, or 56 per cent of the cases of poliomyelitis in 1937, were reported from these three centers of population. However, of the 189 cases occurring in these three cities, sixty-

cases of poliomyelitis are hospitalized in the larger cities, where hospital care is more readily available. The inference from this assumption, and from the figures regarding the abortive type of poliomyelitis, is that the diagnosis of poliomyelitis is facilitated in direct proportion to the accessibility of hospital and laboratory aid. If one considers only the cases showing demonstrable muscle weakness or paralysis, it appears that the three areas of condensation of population (32 per cent of state population) accounted for 46.6 per cent of the cases of poliomyelitis reported for the year 1937.

The classification of abortive and paralytic types of cases as applied to poliomyelitis depends on the demonstration of objective neuro-

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logic findings. The term paralytic is self-explanatory, indicating muscular weakness or paralysis. In addition, any patient showing depression of cutaneous or tendon reflexes, even though

in type. That is to say that an absolute diagnosis could be made in only half the cases without the aid of laboratory examination. For the three cities of Minneapolis, Saint Paul and Duluth, 36.4 per cent of the total cases were the abortive type.

TABLE IV. MORTALITY BY AGE GROUPS, 1937

Age	Cases	Deaths	Mortality
0- 5 yrs.	74	8	10.8%
5-10	101	11	10.9%
10-15	85	10	11.7%
15-20	40	7	17.5%
20-25	19	6	31.6%
25-30	16	3	18.8%
30-35	16	3	18.8%
Over 35	3	0	0.0%
Total	354	48	13.5%

no measurable muscular weakness can be demonstrated, is also classified as paralytic. The abortive case is one having suggestive symptoms, the diagnosis of which, in the absence of peripheral neurological changes, is made usually by examination of the cerebrospinal fluid. Considering that only ten cases were diagnosed as the abortive type outside of the large city districts in 1937, it is a fair premise that many cases of poliomyelitis are overlooked each year. In many cases this situation is admittedly unavoidable. Given even a suggestive set of symptoms, with hospital facilities distant or unavailable, the diagnosis of acute anterior poliomyelitis is not easily made with assurance. In the city of Saint Paul in 1937, with eighty-five reported cases of the disease, 51 per cent were abortive

With the greatest incidence of poliomyelitis occurring in the younger age groups it might be suspected that, as in the more common contagious diseases, there should be predictable increases in the occurrence of poliomyelitis at fairly regular intervals. The graphic record (Fig. 1) of the yearly incidence of the disease in Minnesota shows that this is borne out. Every five-year period from 1908 on has had one year with significant increase in the occurrence of the disease, except for the period just ended (Fig. 1). From these facts it would not be unexpected should there occur a considerable increase in the number of cases in the year or two immediately before us.

Summary

1. Statistics on acute anterior poliomyelitis in Minnesota are presented for the past thirty years.
2. During the past thirty years there has been no tendency for poliomyelitis to disappear in Minnesota.
3. There is a suggestion that the virulence of the causative agent is subsiding, or that man is developing a toleration for the disease. The difficulties in diagnosis, however, makes caution imperative in the interpretation of statistics.
4. The year 1937 showed only a moderate increase in the average annual level of incidence of the disease in Minnesota. There was a slight increase in the mortality rate above the level of preceding years.

Thiamin Chloride and Nicotinic Acid in Pellagra

Spies and Aring (J.A.M.A., April 2, 1938, p. 1081) report on the effect of the administration of vitamin B₁ in six cases of classic pellagra with peripheral neuritis. Irrespective of the cause of the pellagra, prompt relief of spontaneous neuritic pain resulted from the intravenous injection of thiamin chloride (crystalline vitamin B₁ hydrochloride). These observations suggest that vitamin B₁ deficiency plays a part in the development of clinical manifestations of peripheral neuritis associated with pellagra. The vitamin B₁ does not appear to cure the glossitis and stomatitis of pellagra but nicotinic acid, which has been referred to in *The Journal A.M.A.* (Jan. 22, 1938, p. 289; Feb. 26, 1938, p. 622), does relieve these symptoms. The Cincinnati investigators have demonstrated that all types of pellagra are benefited within twenty-four to forty-eight hours after the administration of nicotinic acid. Certainly both thiamin chloride and nicotinic acid deserve further intensive study in their relation to pellagra. (J.A.M.A., April 2, 1938, p. 1115.)

SACRAL BLOCK ANESTHESIA*

A Consideration of the Unusual Difficulties Encountered and a Report of Two Unusual Cases

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BY blocking the sacral nerves, anesthesia is produced which permits operations on the rectum, anus, urinary bladder, prostate, and perineum. Sacral block consists of a combination of caudal and transsacral block. By injecting only the caudal canal, complete anesthesia may be obtained in about 60 per cent of cases, using between 30 and 40 c.c. of a solution of 1 per cent procaine or metycaine. High caudal¹ block is a variation of caudal block in which larger quantities of the anesthetic solution are injected into the caudal canal and the resultant anesthesia obtained amounts to a peridural anesthesia from below upward. The extent of the anesthesia depends largely on the amount of the anesthetic solution injected which determines the height to which the solution rises. The amount of solution used varies from 40 to 90 c.c. and it is necessary to wait thirty minutes or more after injection to obtain complete anesthesia.

Ordinary caudal block must be supplemented in about 40 per cent of cases by transsacral block, in order to obtain complete anesthesia. This consists in blocking the second, third, and fourth sacral nerves bilaterally; occasionally it may be necessary to block the first sacral nerves as well. By combining caudal block with a bilateral block of the second sacral nerves, complete anesthesia may be obtained in about 80 per cent of cases. It is necessary, in all cases, to wait at least twenty minutes after injection to allow the oncoming anesthesia to become complete. For operations on the anus and on adjacent structures sacral block gives the following desirable features: (1) complete anesthesia, (2) complete relaxation, (3) anesthesia of the immediate field of operation only, (4) avoidance of certain systemic effects which frequently are associated with low spinal anesthesia, (5) systemic conditions which contraindicate both spinal and general anesthesia normally do not contraindicate use of sacral block, and (6) the anesthesia produced usually is of sufficient duration to permit the performance of the longest surgical procedures in the region.

The contraindications to the method are few: (1) infection in the region through which the needles must pass, such as infected pilonidal cysts and abscesses, owing to the danger of disseminating the infection, (2) idiosyncrasy to the anesthetic solution or to the vasoconstricting agent used in this solution, and (3) very nervous and hypersensitive patients.

Lundy's paper is a very detailed and complete treatise on the subject of the technic of sacral block. Only a few of the important steps of the method need be reviewed here. The skin over the sacrum is painted widely with an antiseptic solution, such as tincture of metaphen 1:200 or merthiolate 1:1000. The region is then draped. A solution of either 1 per cent procaine or 1 per cent metycaine² may be employed for the injection. The solution of metycaine produces a more rapidly oncoming anesthesia of a somewhat longer duration than procaine. Either solution gives satisfactory results. To 100 c.c. of the anesthetic solution, 1 c.c. of a solution of epinephrine (1:2600) is added. The addition of the epinephrine is essential if the anesthesia is to be of prolonged duration. At the time of injection, the solution should be warm, because a cold solution does not penetrate readily the nerve fibers. A solution which transmits a comfortably warm sensation to the volar surface of the forearm is of a correct temperature.

Before any wheals are raised or any injections are made, the position of the sacral hiatus and sacral foramina should be estimated and a drop of the anesthetic solution placed over the position of each. By so doing, the symmetry or asymmetry of the foramina in relation to the sacral hiatus becomes apparent. This preliminary step becomes very important when abnormalities of the bony sacrum exist. By its relation to the tip of the coccyx and to the sacral cornua, the position of the sacral hiatus is determined, the caudal needle is inserted and 20 c.c. of the anesthetic solution is injected very slowly. Before any solution is injected, frequent aspiration should be made with the bevel of the caudal

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needle in both anterior and posterior positions.

The dangers and effects caused by faulty position of the needles will be considered separately. The fluid should enter the caudal canal without resistance. The caudal needle is left in place until anesthesia has become complete. The trans-sacral portion of the block then is performed. Having identified the posterior superior spine, a point is taken one finger's breadth medial and inferior to it; this point is marked by a drop of solution. This corresponds on each side to the second sacral foramen. One finger's breadth below this point will be over the third sacral foramen and one finger's breadth below this, over the fourth. The position of the sacral hiatus will be found one finger's breadth below the fourth sacral foramen, medially. Should injection of the first sacral foramen be required, it will be found approximately one finger's breadth medial and superior to the posterior superior spine of the ilium. Wheals are raised over these points from below upward. The needles are inserted and the solution is injected. The amount required is usually 2 c.c. in the fourth, 3 c.c. in the third, and 10 c.c. in the second foramina. The foramina of the opposite side then are injected and, finally, in addition, 10 c.c. are deposited in the caudal canal. This brings the total amount of solution used to 60 c.c. If for any reason anesthesia is incomplete, a like amount may be used if required; this still will be within a safe limit of dosage.

Following completion of the block, the patient should not be tested for the presence of anesthesia for at least fifteen to twenty minutes. The testing should be done gently at first with the point of a needle on the skin posterior to the posterior margin of the anus. As the portion anterior to the margin of the anus is the last to become anesthetized, it should be tested last. If pressure with the needle occasions no discomfort, the same procedure is repeated with a tooth forceps. If the patient feels no pain, anesthesia may be considered complete. The presence of complete relaxation of the anal sphincter also should be noted. If an apprehensive patient is tested while the region is still sensitive, severe pain may be occasioned and this will lead the patient to interpret subsequent stimuli as painful, even after complete anesthesia has been obtained. The needles should not be removed until the anesthetist is assured that anes-

thesia is complete. The expected duration of the anesthesia is from one to two hours.

Conditions Affecting Sacral Block Anesthesia

Sacral block is a procedure which requires considerable experience and skill in order to obtain uniformly good results, but with the average case the experienced anesthetist encounters little difficulty. On the other hand, cases are encountered continually which vary from the average, normal case and these complications may be owing to a variety of causes. In such cases, the actual technic of performing the block becomes more difficult and anesthesia is more difficult to obtain. The latter section of this discussion will deal with the difficulties that may be encountered in abnormal cases and the various methods of handling such cases.

Conditions giving rise to these difficulties may be classified as follows: (1) faulty position of the patient during injection; (2) faulty position of the various needles; (3) extremely nervous and apprehensive patients; (4) abnormalities of the bony pelvis, such as differences between the male and female pelvis, previous injuries to the bones causing distortion of the landmarks and asymmetry, and osseous deposits in the foramina; (5) abnormalities of the soft parts, such as excessive subcutaneous fat, infection over the region of injection, and formation of scars distorting the soft parts, and (6) idiosyncrasies to the solutions employed, such as sensitivity to the anesthetic solution and sensitivity to the vasoconstricting agent.

Faulty position of the patient.—The correct position of a patient for sacral block is the prone position with the arms extended, the elbows semiflexed, the palms of the hands flat, and the head turned to the side opposite the one being injected. Two small flat pillows are placed under the pelvis and the sacral rest is elevated moderately. The patient is instructed to assume a "pigeon-toed" position (toes together and heels apart). This position makes the bony points of the posterior part of the sacrum more prominent and relaxes the muscles overlying them. The patient also is instructed to relax the muscles in that region as much as possible.

Faulty position of the needles.—The caudal needle in place in the caudal canal of the male will lie more nearly parallel with the horizontal plane of the body (when the patient is in the

prone position) than when in the caudal canal of the female because of the greater degree of pelvic curvature of the latter. If this point is not remembered, it is easy to pass the caudal needle over the posterior wall of the sacrum. The bone always should be touched with the point of the needle, both anteriorly and posteriorly. When injecting the caudal canal, the palm of the hand should be placed over the sacrum so that any extravasation of fluid in that region will be appreciated. Frequent aspirations should be made before any solution is injected in order to make certain that the point of the needle is neither in a vein nor within the dura. If the point of the needle is kept below the level of the second lumbar vertebra there is little danger of this taking place. When there is any doubt regarding the aspiration of spinal fluid, the point of the needle should be withdrawn until no further aspiration can be made. In certain cases it is possible to aspirate a straw-colored cystic fluid on introduction of the caudal needle. In these cases, it is preferable to do a low spinal block, although the aspirated fluid obviously is not spinal fluid. When the bevel of the caudal needle has scraped the bony wall of the caudal canal, a hematoma may be formed and blood may be aspirated. This will also occur if the point of the needle has been introduced into a vein. In cases of carcinoma of the rectum particularly, the venous plexus within the canal seems to be very extensive. If aspiration of blood continues to occur with the point of the needle in various situations, this part of the injection should be delayed until the remainder of the block has been completed. This gives a chance for bleeding to cease. Even after bleeding has ceased, the injection into the caudal canal should be made with caution, because under such circumstances the solution may be absorbed more rapidly than normally into the circulation. When the aspiration of blood persists, the caudal injection should be withheld and the transsacral part of the block should be depended on for anesthesia.

The needles, when inserted correctly into the foramina, will be roughly at right angles to the caudal needle. In inserting these needles, no great amount of force should be used, especially if bone is encountered. The shaft of the needle should not be bent during the insertion. These errors easily may result in the breaking off of part of the needle under the skin. The wheals

should be raised slightly lateral to the foramen so that, before the needle is inserted, the skin may be pushed medially. This allows freedom of movement of the skin and subcutaneous tissue when inserting needles in the opposite side and prevents force being transmitted to those needles already in place. It is important that the point of the needle be inserted a distance of only a half finger's breadth into the foramen. If inserted too far the anesthetic solution will be extravasated anteriorly and will not reach the nerves.

Nervous patients.—Most patients tolerate the injection well if they are told what is about to happen and if injection of solution is made ahead of the needle, as the needle is being inserted through the tissues. A few patients are extremely intolerant. In many of these cases, if the injection can be made into the caudal canal and this injection allowed to take effect before the remainder of the block is attempted, the resultant anesthesia obtained may make the transsacral portion of the block bearable. Much apprehension may be combated by adequate premedication with morphine and pentobarbital sodium. Rarely is a patient so intolerant that his movements cause a needle to be broken. In such cases, it may be preferable to carry out the operation under intravenous anesthesia with pentothal sodium.

Abnormalities of the bony pelvis.—Differences between the male and female pelvis are the first consideration. The female pelvis is broader and the sacrum is more curved than that of the male. This results in some variation in the position of the needles both in the foramina and in the caudal canal. The fact that the male sacrum is more flat causes the caudal needle, when correctly inserted, to lie almost parallel with the horizontal plane of the body when the body is in the prone position. The curvature of the sacrum of the female results in the caudal needle pointing upward and more forward when in position, thus increasing the angle between the shaft of the needle and the horizontal plane of the body when the body is in the prone position. This feature must be borne in mind when inserting the caudal needle when treating women, for, if the plane of insertion of the needle is too flat, it may pass upward over the posterior surface of the sacrum instead of entering the canal itself.

The posterior superior spines of the female pelvis are farther from the midline than those of the male, because of the increased breadth of the former over the latter. As the second sacral foramen bears a constant relationship to the posterior superior spine, the imaginary lines passing through the two rows of needles inserted in the foramina of each side of a female pelvis will have a greater divergence from below upward than such lines passing through needles so placed in the male pelvis. In the latter, the two rows of needles will be more nearly parallel.

Injury and displacement of the bones are the second consideration. Old fractures involving the pelvis and the sacrum may result in varying degrees of displacement of the bones in whole or in part with accompanying distortion of the bony landmarks. Other factors leading to a similar condition may be congenital displacement or previous operations in the region. The coccyx itself may be displaced or absent. Although the sacral cornua usually can be palpated, among certain patients, particularly among the obese, definite prominences cannot be felt. Although the posterior superior spine on one side is usually symmetrical with that of the opposite side, some cases present wide discrepancies. However, even after injury to the sacrum there is usually a symmetrical relationship between the posterior superior spine and the second foramen of the same side and, also, between the foramina themselves. For these reasons, it is erroneous to use the needle inserted in the foramen on one side as a guide for inserting those on the other side.

Osseous deposits in the foramina are the third consideration. When inserting the needles in the foramina, only light pressure should be applied and, as the needle passes inward, this pressure should be decreased. Marked resistance usually indicates that the point of the needle is on bone and excessive pressure may result in breaking the tip of the needle or in hooking the point. Among some elderly patients, the foramina may be ossified partially or completely, leaving a small opening or none at all. In such cases, a cautious increase in pressure may be required to insert the needle. Undue movement of the patient's hips when the needles are in place also may result in breaking the shaft of a needle. During the injection of the anesthetic solution,

the shaft of the needles must be supported. If a large portion of a needle breaks beneath the surface of the skin and cannot be recovered, it will be preferable to incise the overlying skin and remove the needle at once. If only the point is missing, probably it will do little harm and will be better left alone.

Abnormalities of the soft parts.—Excessive subcutaneous fat is the first consideration. In the main, among obese patients there is greater difficulty in placing the needles correctly than among patients of average weight. In the latter, the bony landmarks usually may be seen as well as palpated. Increase in fat progressively masks these landmarks until none of them can be felt accurately. When such is the case, various digressions from the standard technic are necessary. The usual routine is to insert the caudal needle followed by those of the foramina. When none of the landmarks for inserting the caudal needle is palpable, the procedure should be reversed. Even among the most obese patients, a definite dimple in the skin will be evident overlying the region of the posterior superior spine. Using this as a landmark, one may locate the second, third, and fourth foramina on either side and insert the needles. The situation of those in the fourth foramen of either side then will serve as a guide to the location of the sacral hiatus. A needle 50 mm. in length may not be long enough to reach the foramina of such subjects and one 80 mm. in length should be used.

Infection in the region is the second consideration. One definite contraindication to sacral block is the presence of infection in the skin or subcutaneous tissue through which the needles must pass. Such conditions as infected pilonidal cysts, large abscesses or furunculosis of the skin, or infection from any cause make it advisable to perform a low spinal block or, possibly, to give an intravenous anesthetic. In the ordinary case, care must be taken to prevent introduction of infection, particularly from the region of the anus. The tip of the coccyx always should be palpated through a sterile towel. Multiple punctures by needles also increase the risk of infection. Occasionally, small pustules form at the site of the punctures because of careless technic.

Formation of scars is the third consideration. It is a frequent fault of beginners to be guided by the soft parts (gluteal cleft and midline) rather than by the bony landmarks. Such technic is

certain to give rise to error, as the relation of the soft parts to the bones may possess any degree of variation, particularly following accident and injury. Accidents occur resulting in injury to the region in which the bones are not affected, but the overlying soft tissue may be so lacerated that, in healing, the resultant formation of scars with contraction may distort the normal contour of the skin grossly. Scarring from infection or from suppuration of long standing also may result in similar deformities. Two abnormal cases to be described subsequently will serve to bear out these conclusions.

Idiosyncrasies to the solutions used.—A patient may be sensitive to the anesthetic solution, to the vasoconstricting agent, or to both. Reactions to anesthetic solutions are frequent. Careful questioning of the patient before the injection is made may reveal this. The vasoconstricting agent is necessary to obtain duration of anesthesia but many patients are sensitive to epinephrine, and, in such cases, it should be omitted or cobefrin should be substituted. The preliminary injection should be made very slowly and should be discontinued if signs of hypersensitivity appear. Similar effects may result if the injection is made intravenously. Nausea and vomiting are complications which may occur. Inhalation of 90 per cent oxygen and 10 per cent carbon dioxide usually relieves these symptoms.

Case Reports

The following report of two abnormal cases is submitted in support of some of the previous statements.

Case 1.—A man, aged sixty-three years, weighed 140 pounds. Twenty years previous to his admission, he was run over by a wagon which weighed 4,300 pounds. One of the wheels passed over his pelvis. He was incapacitated for three weeks but was able to resume an active life about two months after the accident. Walking was not impaired. The reason for seeking medical attention at this time was because of increasing constipation and the passage of mucus and, recently, blood from the bowel. Examination revealed polypoid adenocarcinoma of the rectum, grade 1 (on the basis of 1 to 4), and hemorrhoids. The lesion was fulgurated under sacral anesthesia.

On examination of the sacral region at the time the sacral block was performed, gross bony abnormalities appeared to be present. The whole sacrum appeared to have been pushed to the right. However, the needles were inserted without difficulty and good anesthesia was obtained. Roentgenologic examination of the region did not reveal any distortion of the bones.

The accompanying photograph (Fig. 1) in which the landmarks are indicated by markings with a colored solution, will give the reader a clear picture of what had happened. The two upper dots are over the posterior superior spines, the next three are over the



Fig. 1. Upper vertical line follows the alignment of the spines of the vertebrae; the lower line is a continuation upward from the gluteal cleft. The uppermost spot on each side overlies the right and left posterior superior spines, respectively; below them the pairs of three spots on each side overlie the second, third, and fourth sacral foramina, respectively. The lowest spot is the site of the sacral hiatus. Note how the skin overlying the sacrum has been pulled to the right by contracted fibrous tissue so that a continuation of the midline of the skin as extended upward from the gluteal cleft passes to the right of the sacral foramina on the right side.

second, third, and fourth sacral foramina of either side and the lower one represents the sacral hiatus. The midline of the skin has been extended upward from the gluteal cleft. The upper line marks the spinous processes of the lumbar vertebrae. The previous injury had torn the subcutaneous tissue so that the subsequent formation and contraction of scars which resulted had pulled the skin to the right, so that a line projected upward from the gluteal crest fell to the right of the right sacral foramina, giving the illusion that the bones had been distorted. This case shows the importance of relying solely on the bony landmarks.

Case 2.—A man, aged sixty-two years, had rectal trouble with an abscess near the rectum which began thirteen years previous to admission. Sinus tracts formed which periodically opened and closed, and at times new abscesses formed. Three operations had been performed in the past eleven years. In addition, his left leg had been run over thirty years previously. A stiff hip joint developed subsequently. On admission, the perirectal region contained many indurated masses, fistulous openings, and scars (Fig. 2). A sacral block was performed prior to operation and adequate anesthesia resulted. The prolonged suppuration and formation of sacral scars resulted in considerable distortion of the soft tissues as illustrated in Figures 3 and

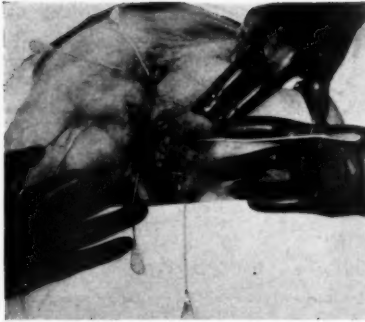


Fig. 2. The condition of the region of the anus previous to operation; probes have been placed in the multiple sinus tracts.

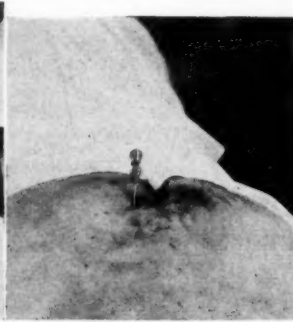


Fig. 3. The relation of the caudal needle, inserted in the caudal canal, to the gluteal cleft.

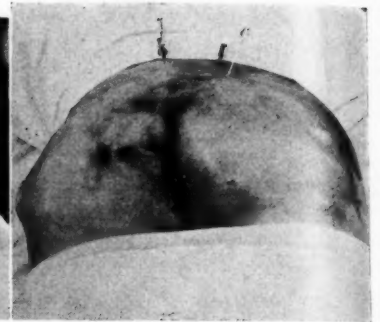


Fig. 4. The relation of the needle in the caudal canal and those in the various foramina to the gluteal cleft and anal region.

4. Figure 3 is an illustration of the caudal needle in place in the caudal canal. Note how the gluteal cleft has been displaced to the left. Figure 4 is an illustration of all the needles in place; a line projected upward from the gluteal cleft, passes through a line joining the foramina on the left side.

Cases such as these are examples of the abnormalities which may occur in the region of the sacrum and how they may affect the performance of a successful sacral block. Sacral anesthesia

has many advantages and few disadvantages. It supplies ideal operating conditions for the surgeon and involves a minimal risk to the patient.

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DIAPHRAGMATIC HERNIA*

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THE diagnosis and treatment of diaphragmatic hernia has received increasing attention during the past few years. There is no reason to assume the condition to be more prevalent than heretofore, but rather that improvement in diagnostic methods has made its presence more easily and thus more frequently proven. Development in roentgenological technic, together with accurate clinical observation, has resulted in the placing of diaphragmatic hernia in the list of commoner conditions. Too often in the past improper treatment has been due to failure in diagnosis. In obscure abdominal conditions the possibility of its existence must always be borne in mind.

In 1853 Bowditch reviewed the subject of diaphragmatic hernia and reported a case seen at the Massachusetts General Hospital, observing that earlier writers believed that a wound of the diaphragm was always fatal. He quotes Dr. Fothergell, whose letter to Dr. Mead about one

hundred years before gives a very interesting account of a case of diaphragmatic hernia. Dr. Fothergell says, "Everyone skilled in medicine, I think, will suppose from the history that the disease was a new one. But who would ever have conjectured that the diaphragm was divided asunder and that a large portion of the stomach and intestines had rushed through the opening into the breast." A century and a half before this letter was written, two cases were reported in the *Opera Chirurgica* by Ambrose Paré. One of these proved the fallacy of the older writers in believing a wound of the diaphragm was always fatal.

Bowditch collected eighty-eight cases and stated that he had carefully examined many works and journals from 1610 to 1846, believing that few more could be found.

Harrington points out that the clinical study of proven cases has established a fairly definite symptomatology, very helpful in making a diag-

*Presidential address before the Minnesota Academy of Medicine, January 12, 1938.

nosis or at least suspecting the presence of a diaphragmatic hernia.

At the Mayo Clinic between 1900 and 1925, thirty cases were recognized, of which nineteen patients were operated upon. From 1925 to 1935, one hundred and ninety-seven cases were recognized with one hundred and five patients operated upon. Harrington further points out that the condition is more common than believed at present, as he has made examinations of the diaphragm during other abdominal operations and has occasionally found a small hernia which had not been recognized clinically or roentgenologically before operation.

Diaphragmatic herniae are considered true or false depending on whether or not a sac is present. They are further divided into congenital and acquired, the latter possibly traumatic in origin. In this classification a congenital hernia is understood to have been present at birth, the absence of a sac indicating that the hernial opening was due to the failure of the development or fusion of one or more of the anlagen of the diaphragm. Occasionally a congenital hernia has a sac and this is evidence of hernia formation after the complete separation of the pleural and peritoneal cavities.

The acquired hernia develops after birth and usually has a sac. This type generally occurs at the esophageal opening, the para-sternal foramen, or the lumbo-costal trigone.

A traumatic hernia may be caused by direct or indirect injury or by inflammatory necrosis of the diaphragm. In a direct injury such as a gun shot or stab wound, the hernia may occur at any point. When the injury is due to an indirect influence such as a crushing chest injury, the most frequent location of the rupture is the dome and posterior half of the left hemi-diaphragm. This type of hernia usually has no sac. When the hernia occurs at the esophageal opening there is a sac present. If the injury to the diaphragm is caused by inflammatory necrosis, the opening in the diaphragm is usually posterior and there is no hernial sac.

The symptoms in these cases depend on the structures involved in the hernia. When the stomach is the only organ involved, a very different picture is presented from that in which the intestines, as well, are herniated through the diaphragmatic defect. The diagnosis is not infrequently missed because the symptoms present-

ed are referable to the chest; shadows may be present on the roentgenogram readily simulating a number of other conditions. It will be seen, therefore, that the possibility of a diaphragmatic hernia should always be borne in mind during routine chest x-ray examinations.

Herniations of the fundus of the stomach may result in typical cases of hour-glass deformity, and, because of the altered blood supply of the diaphragm and traumatism following its constant movement, ulceration may result. In some cases malignant changes have been found. With accurate observation loops of bowel or portions of the stomach may be seen in the chest without the administration of barium, if the possibility of hernia is borne in mind. The freedom of fluid or gas in the bowel, or the presence of some pleural thickening, may so mask the picture that an incorrect diagnosis is made. Truesdale cites a case in which such an error in diagnosis was made and a quantity of milk was removed by exploratory thoracentesis. Downs cites cases with death resulting from exploratory thoracentesis. Many patients with these conditions have been classed as neurotics because of the vagueness of their symptoms.

The manifestations of diaphragmatic hernia are frequently very complex and simulate those of various other organic conditions in the abdomen and thorax. Not infrequently one or more incorrect diagnoses have been made in these patients before the presence of a diaphragmatic hernia is discovered. It has often been confused with gall-bladder disease, gastric or duodenal ulcers, hyperacidity, secondary anemia, cardiac disease, carcinoma of the cardia, stricture of the esophagus, appendicitis, or intestinal obstruction.

In the congenital hernia the symptoms are usually present immediately after birth or at least in the early weeks or months of life. Many of these patients die a few hours after birth from respiratory and circulatory failure. Truesdale points out that diaphragmatic hernia may be more common than suspected from mortality statistics. He feels that autopsies are done less frequently in children than in adults and without a post mortem examination there is always a possibility of an error in diagnosis.

Should an infant with a diaphragmatic hernia survive a few weeks, the chief symptoms are cyanosis and dyspnea, but as the child grows older these symptoms become milder and those of

a digestive disorder become more prominent. A patient with a congenital hernia living to adult life has an unusually fixed mediastinum. Such patients may be symptom-free, but when evidence of any disturbance does occur the picture is usually that of an intestinal obstruction.

Hiatus herniæ often cause considerable disturbance of respiration, circulation, and deglutition. In 1933, Junfer reported a case of an esophageal hiatus hernia in a man sixty-five years of age, the sac containing the stomach and most of the omentum. The esophagus measured only seventeen centimeters in length, and was believed to be a true esophageal hiatus hernia acquired early in life. The stomach had entered the chest early and since there was no traction on the esophagus, it remained short. It is readily understood that in this patient there had been no constriction of the stomach and the diaphragm maintained its normal rhythmic movements. In patients with a hiatus hernia with no other pathological complications the symptoms are fairly well understood, since more individuals of this type have been carefully studied. There is usually a sense of fullness in the substernal region and this is associated with substernal distress. Hiccough and heartburn are frequently present. If a large amount of food is taken just before retiring these symptoms are exaggerated. Relief is usually obtained by vomiting. Other cases may present epigastric fullness after meals. There is rarely a complaint of pain and the distress is substernal rather than epigastric.

The symptoms produced by traumatic hernia vary according to the viscera herniating through the diaphragmatic opening. As this type of hernia is without a sac there is usually a greater amount of abdominal contents passing into the thoracic cavity. When the opening is small, due to direct injury, such as a stab or gunshot wound, obviously only a small herniation can take place; in the indirect injury resulting from a severe blow or crushing chest injury, the hernial opening may be very large and the stomach, with most of the intestines, is frequently found in the chest. This is especially true if the diaphragmatic injury is on the left side. When it occurs on the right side the liver frequently is partially or wholly herniated through the opening and it is unusual to find any extensive herniation of the stomach and intestines.

In this type of a hernia the patient complains

of abdominal cramps and considerable gastric distress, especially after eating. There may be respiratory distress evidenced by shortness of breath due to the pressure on the lung and mediastinum by the viscera in the pleural cavity. There may be constipation, and, when a laxative is taken, active peristalsis causes a gas rumbling in the chest which is audible to the patient. This is a very annoying symptom.

When one has this type of case under observation the possibility of an intestinal obstruction developing must be constantly borne in mind. Because of the general condition of cases that have had severe injury with resultant diaphragmatic hernia, it is frequently impossible to repair the hernia until the patient's condition improves.

The diagnosis of herniæ of the diaphragm has become much more frequent with the refined and exact roentgenological methods that are being used, and it is felt that x-ray demonstration is the only sure means of diagnosis. It has been pointed out that the x-ray is not infallible and not infrequently small herniæ are missed. Jenkinson and Roberts feel that less than five per cent of the small herniæ can be identified if the patient is examined only in the erect position. It is evident that close coöperation between the roentgenologist and the clinician is necessary as it is not uncommon to have these cases present a symptom-complex that is not understandable after the most searching examination, and as many of the conditions which cause symptoms referable particularly to the upper abdomen and chest simulate those presented by various types of diaphragmatic hernia, it is essential to keep this possibility in mind. This observation is applicable to the congenital, acquired, and traumatic types of hernia. In the traumatic cases the diagnosis should usually be rather simple, as the symptoms are more acute and the physical findings are much more definite. As pointed out, a good x-ray examination is most essential and this should be carried out in all cases that have had a direct or indirect injury of the chest. Any case that has had a crushing injury of the chest should have a complete gastro-intestinal examination, including a barium enema. If this routine is followed, most traumatic herniæ will be diagnosed. Pneumoperitoneum may be a helpful diagnostic aid in differentiating a diaphragmatic hernia from an eventration of the diaphragm.

Another condition that must be differentiated

from diaphragmatic hernia is the congenital short esophagus. In 1931, Findlay and Kelly discussed an anomaly that was characterized by congenital shortening of the esophagus and the presence of a portion of the stomach in the thoracic cavity. There was also a stenosis of the junction of the esophagus and thoracic portion of the stomach.

It is very important from a surgical standpoint to determine whether one is dealing with a shortening of the esophagus, with resulting partial or complete intrathoracic stomach, or whether there is a herniation of the stomach into the thoracic cavity.

One must also consider the possibility of the presence of a diaphragmatic hernia in cases of dextro-cardia.

Reduction of the hernia with repair of the hernial opening is the only means of definitely relieving the symptoms. There are undoubtedly many cases of diaphragmatic hernia that are symptom-free, and as long as strangulation does not occur the presence of abdominal viscera within the chest is not incompatible with life.

A most troublesome complication is that of intestinal obstruction, the mortality from intestinal obstruction being higher because of the necessity of the hernia repair. When the stomach is the only viscus involved, incarceration may occur and not strangulation, and the mortality is not as high. Truesdale advocates the employment of a two-stage operation to reduce the mortality occurring when dealing with cases complicated by intestinal obstruction. He advises first an appendicostomy or cecostomy to relieve the obstruction, the hernial repair being an operation of election.

In congenital hernia in infants the results of surgical repair have been disappointing, although some successful cases have been reported. The most favorable types are those passing through the left pleuroperitoneal canal, lateral defects in the septum, and small herniæ around the esophagus. The abdominal approach is preferred, as there are rarely any adhesions present. It is important to overcome the pneumothorax at the conclusion of the operation.

In discussion of the repair of the acquired type, the method of approach is dealt with in detail. Some surgeons prefer the thoracic operation while many prefer to use, when possible, the abdominal approach. If the hernia is on the right side, the thoracic approach is selected, since the

liver interferes with adequate exposure, making the repair difficult.

Harrington thinks there is less risk of thoracic complications when the abdominal approach is used, and he uses this approach in all cases of hernia through the left hemi-diaphragm. He feels it is of particular advantage in cases of hernia through the esophageal opening, as the herniated stomach is usually confined in a sac in the posterior mediastinum and does not enter the true pleural cavity.

It is sometimes necessary to do a combined thoracic and abdominal operation as the viscera may be involved by adhesions which can not be freed from either abdominal or thoracic exposure alone.

Crushing of the phrenic nerve is frequently done in the traumatic herniæ that have a large opening, since the repair of an inactive diaphragm is easier. Crushing does not cause permanent injury to the nerve, and the diaphragm resumes its activity again in six to nine months.

I wish to present five cases of diaphragmatic hernia emphasizing some of the clinical manifestations that have been discussed.

Case 1.—A woman thirty-five years of age was first seen on February 25, 1935. She stated that she had suffered more or less upper abdominal distress for nineteen years. At that time she fell, striking the handle bars of a bicycle so severely that the bar was broken. She subsequently had severe pain in the abdomen and was ill in bed a number of days. Since that time she has had occasional spells of nausea and vomiting after meals. The vomiting has been more frequent during the past three years, occurring almost daily. The attacks never came before meals and were always worse when lying down.

The clinical impression was that of gall-bladder disease. An x-ray examination showed a non-functioning gallbladder but all relevant physical findings at that time were negative. In March, 1935, a gastro-intestinal tract x-ray study showed a herniation of the cardiac end of the stomach through the esophageal opening.

She was kept under observation on medical management, but since the symptoms did not subside it was felt that the diaphragmatic hernia was the cause of her disability.

After reducing her weight 15 pounds, an operation was performed on May 18, 1936. The roentgenologic findings were substantiated. The hernia was reduced and the esophageal opening, which readily admitted three fingers, was sutured. She made an uncomplicated recovery. A radiograph taken June 4, 1936, showed the hernia reduced and a picture on October 17, 1937, shows no recurrence. At present she is in good health and has complete relief of her symptoms.

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Case 2.—A woman thirty-three years of age was first seen on October 18, 1935. She had been well until one year before, when she developed attacks of heartburn followed by nausea and vomiting. Occasionally she noted sharp epigastric pain radiating from the um-

when her weight was found to have increased to 212 pounds. She stated that until June, 1937, she felt well and had had no return of the symptoms experienced before the operation in April, 1936. Since June, 1937, she has had attacks of smothering at night and at intervals



Fig. 1. Case 1. Esophageal hiatus hernia.



Fig. 2. Case 1. Radiograph taken one and a half years after repair. No recurrence.



Fig. 3. Case 2. Shows esophageal hiatus hernia.



Fig. 4. Case 2. Radiograph taken three months after repair shows no recurrence.



Fig. 5. Case 2. Radiograph taken one and a half years after repair shows a recurrence.

bilicus to the epigastrium and the right scapular region. The pain was relieved by vomiting and deep breathing. She had had nausea during the last six weeks and vomiting had become more frequent.

The patient was markedly overweight. Disease of the gallbladder or peptic ulcer was suspected, but x-ray examination showed a normally functioning gallbladder and there was no evidence of a lesion of the stomach or duodenum. There was found, however, a slight herniation of the cardiac end of the stomach through the esophageal opening. The diaphragmatic hernia was thought to be the cause of her symptoms and an operation advised.

She was put on medical management, reducing her weight from 210 pounds to 165 pounds.

On April 25, 1936, she was operated upon. The hernia was repaired and she made a good recovery. X-ray examination in June, 1936, showed no evidence of the hernia. This patient was last seen in October, 1937,

a gnawing sensation in the substernal region. The intervals between attacks ranged from a few days to three or four weeks. X-ray examination in October, 1937, showed a recurrence of the hernia. If this condition progresses her weight should again be reduced and another repair undertaken.

Case 3.—A woman sixty-one years of age was first seen in May, 1937. She dated the onset of her illness by an attack of whooping cough which she contracted when a child. Since that time she had noted heartburn, nausea, occasionally associated with vomiting, and pain in the back and under the left costal margin occurring one to three hours after meals. She could not eat large quantities of food without vomiting, and during the past year she had marked dyspnea after meals. The symptoms were aggravated when lying down.

She consulted several physicians because of stomach trouble, and had been on an ulcer diet several times.

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Each time the symptoms were aggravated. There was nothing of note on general examination. On x-ray examination the gallbladder was reported as normal, but the gastro-intestinal examinations showed an extensive herniation, through the esophageal opening, of the cardiac end of the stomach.

very obvious finding of a loop of intestine in the thoracic cavity.

Case 5.—A man sixty-three years of age was first seen at home on November 10, 1935, by Dr. J. N. Gehlan of Saint Paul, Minnesota. The patient had been in



Fig. 6. Case 3. Large esophageal hiatus hernia.

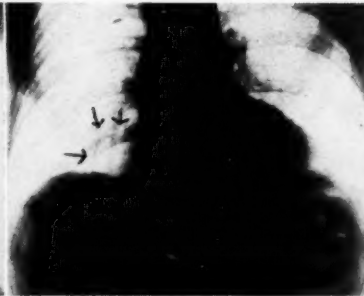


Fig. 7. Case 4. Herniation of colon through opening in right diaphragm.

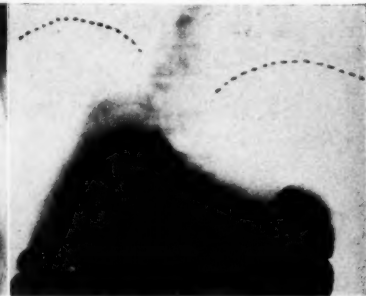


Fig. 8. Case 4. Barium enema one year after repair shows no recurrence.

On May 1, 1937, an operation was done for the repair of the hernia. The esophageal opening readily admitted three fingers. The immediate postoperative condition was satisfactory although her pulse rate was one hundred and forty. She was placed in an oxygen tent and stimulation was given. The day following the operation a blood transfusion was done and her condition improved. Forty-eight hours after the operation she had a sudden attack of dyspnea and cyanosis. A second transfusion was done but she continued to complain of dyspnea. Examination of the chest revealed no abnormalities. Later that day the patient appeared very alert and coöperating, but died suddenly following a short conversation with the nurse.

An autopsy revealed the cause of death to be multiple pulmonary emboli.

Case 4.—A man forty-three years of age was seen in June, 1935. He had been under treatment off and on since 1914 for duodenal ulcer. An x-ray study showed the presence of a duodenal ulcer with some pyloric obstruction. A gastro-enterostomy was advised and this was done in July, 1935. On opening the abdomen the liver and duodenal areas were obscured by the colon that ascended into the right thoracic cavity through an opening in the diaphragm. The opening was about 4 inches in length and there was a sac present. The colon was easily reduced as there were no adhesions between the colon and the hernial sac. The defect in the diaphragm was repaired. The duodenal ulcer was found and a posterior gastro-enterostomy was done. On further questioning of the patient it was learned that at the age of nine he had fallen from a horse, striking his right side. The probability is that the hernia dates back to this accident. He has gained weight since his operation and his gastric symptoms have disappeared. The interesting observation in this case is that the roentgenologist's attention was so focused on the stomach and duodenal examination that he did not observe the

an automobile accident on October 12, 1935. He stated that he fractured three ribs on the left side, that he had an injury to his left hip and back.

Immediately after the injury he was hospitalized and an adhesive dressing was applied to his chest. He developed bronchopneumonia and was in the hospital three weeks, after which he was moved to his home in Saint Paul. At the first examination at his home he said he felt fairly well but was bothered by a persistent cough and considerable expectoration. Examination of the chest showed dullness over the left side posteriorly. The breath sounds were suppressed and coarse râles were heard throughout the right chest. The right border of the heart was six centimeters to the right of the sternum. Abdominal examination showed no abnormalities. There was some tenderness in the lumbosacral region. On November 16, 1935, the cough had increased but the lung findings were unchanged. There was a slight temperature elevation and he complained of some abdominal distress. On November 21, 1935, he complained a great deal of abdominal cramps. The cough had improved but the dullness persisted in the left chest with bronchial breathing on the left side posteriorly. He was then sent to the hospital for x-ray study of his chest and his back, which showed a fracture through the first segment of the sacrum on the left side.

Stereoscopic studies of the chest showed impaired aeration of the left lung with elevation and flattening of the diaphragm. There were numerous air-filled pockets with intervening areas of fibrosis. There was an area of consolidation in the base of the left lung, but this was somewhat obscured by a dense cloudiness. The right lung was clear. A diagnosis was made of thickened pleura with trabeculating adhesions in the lower left chest with the possibilities of a small amount of fluid and an area of consolidations in the left base. Because of this rather confusing report and the per-

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sistence of the symptoms, the clinician did a thoracotomy which proved negative.

A gastro-intestinal radiograph was made which showed that the entire stomach, all the jejunum, part of the ileum, and a loop of the colon had passed into the

mothorax was relieved. After the first week, however, his condition improved and he made a satisfactory recovery. He developed an infection in the lower end of the operative wound and he now has a small incisional hernia. His general health at this time is exceptionally



Fig. 9. Case 5. Chest plate showing numerous air-filled pockets with intervening fibrosis.



Fig. 10. Case 5. Entire stomach, the jejunum and part of the ileum seen in left thoracic cavity.



Fig. 11. Case 5. Barium filled colon seen in the left thoracic cavity.



Fig. 12. Case 5. Radiograph taken three months after repair shows no recurrence.



Fig. 13. Case 5. Radiograph taken one and a half years after repair shows no recurrence.

left thoracic cavity through a rupture in the left hemidiaphragm.

I was asked to see the patient November 30, 1935. He was still very nervous and weak, and was having considerable gastric distress and constipation, but as there was apparently no intestinal obstruction, I advised close observation and postponement of the operation until his general condition improved. On May 10, 1936, he was admitted to the hospital and the left phrenic nerve was crushed, and on May 16, 1936, the repair of the hernia was undertaken. A very large opening was found in the left hemidiaphragm. Fortunately, no adhesions had formed between the abdominal viscera and the pleura. The abdominal viscera was replaced in the abdomen and the defect in the diaphragm was repaired.

The patient had a difficult time for a few days. He was placed in an oxygen tent immediately and the pneu-

good and roentgenograms taken in July, 1936, and October, 1937, show no evidence of recurrence of the hernia.

Through the courtesy of Dr. Kano Ikeda, I am able to show a case of congenital diaphragmatic hernia:

Case 6.—One sees from the illustration that the defect is on the left side and the left thoracic cavity is crowded with abdominal viscera pushing the heart and lungs to the right thoracic wall. The radiograph shows the gas filled intestinal loops filling the entire left thoracic cavity. It is readily understood that a hernia of this type is incompatible with life.

The abdominal approach was used in the surgical repair of the cases reported. Ethylene and

ether inhalation anesthesia was employed, and in the case of the large traumatic hernia the administration was by the intratracheal method. The defects in the diaphragm were sutured with silk

4. A thoracentesis is contraindicated until the possibility of a diaphragmatic hernia has been eliminated.

5. Operative repair of the diaphragmatic de-



Fig. 14. Case 6. Congenital diaphragmatic hernia with the left thoracic cavity crowded with abdominal viscera.



Fig. 15. The gas-filled intestinal loops fitting the entire left thoracic cavity.

sutures together with living sutures of fascia lata which were taken from the patient's thigh.

In the first case of esophageal hiatus hernia, the hernial sac was removed, but in the second and third cases the stomach was freed from the hernia sac and the sac was allowed to retract into the posterior mediastinum.

It is very important to prepare these patients adequately for operation, as it is a severe operation that is frequently followed by considerable shock. It is therefore advisable to be prepared to use the oxygen tent for several days and blood transfusion will often be of great aid. The cases in which the viscera have been removed from the thoracic cavity frequently develop pleural effusion. This may be very slight but at times it is so extensive that it causes respiratory embarrassment and must be removed.

Summary

1. Improved roentgenologic methods have been a great aid in making a positive diagnosis of a diaphragmatic hernia.

2. A diaphragmatic hernia should always be considered when a confusing problem presents itself concerning the upper abdomen or chest.

3. In all severe chest injuries a careful x ray examination of the chest and gastro-intestinal tract including a barium enema should be carried out to determine the condition of the diaphragm.

fect after reduction of the hernia offers the only means of permanent relief.

6. Five cases of diaphragmatic hernia in which operation was performed are here reported. In this group three patients were cured, there is one recurrence and one death.

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SYMPTOMATOLOGY OF THE VARIOUS LEUKEMIC STATES*

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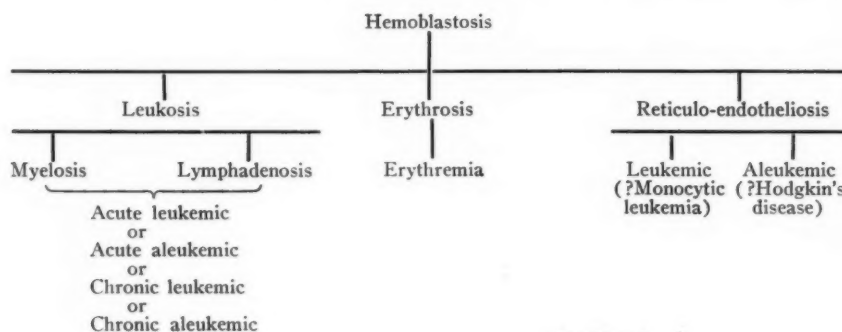
I DESIRE to present some observations concerning the symptoms and physical findings in leukemia, based upon a small group of thirty-four cases, and to present a brief clinical record of a few cases of special interest.

Ordinarily the diagnosis of leukemia may be made easily and with assurance. The clinical investigation at once indicates the necessity for an examination of the blood, and if, after this examination, for any reason we are still uncertain, the assistance of an expert blood cytologist in the great majority of instances will promptly and

unknown. At present, most observers class it with the tumors, though some argue for an infectious etiology. The preponderance of opinion and evidence seems to be in favor of the former.

Chart 1 represents Piney's ideas concerning hemato-poiesis.

In Chart 2, I have listed the presenting symptoms in a small series of thirty-four cases. I have grouped them merely as chronic, and acute or subacute. The symptoms are varied, quite as may be found in any text. Any of these indi-



(A. Piney)

CHART 1

accurately establish the diagnosis. Not infrequently, however, atypical forms of the disease are encountered, and even though we include leukemia in our list of possibilities, we may find that we are unable to do more than this. A given case may at one time present evidence indicating one particular entity, and later give what appears just as good evidence for another. Again, a patient may at one time present the symptoms of a slowly progressive, chronic disease, and at another time show acute manifestations. It is necessary to keep in mind the essential dictum that the disease is one of the hemato-poietic tissues, and that the quantitative and qualitative changes found on blood examination are indicators of the changes going on in the blood forming centers.

The essential cause of the disease is, of course,

*Read before the Minnesota Academy of Medicine, November 10, 1937.

vidual symptoms alone means little, any of them occurring in a wide variety of conditions. Perhaps in presenting the clinical summaries, I may be able to group them in such a way as to make them mean more. At this point I merely want to comment on a few particular items. Weakness and fatigue were prominent complaints, even though the patient appeared quite robust and no anemia existed.

The frequency of the association of sore mouth, ulceration, necrosis, and bleeding, with the leukemic states (usually acute), recommends to the physician, laryngologist, and dentist, that he consider this relationship, even though a seemingly adequate cause may be present (Vincent's organisms). It is somewhat surprising perhaps that glandular enlargement does not appear with greater frequency; however, I ask you to compare it with the adenopathy in Chart 3 which illustrates the physical findings.

LEUKEMIA—PEPPARD

Jaundice was complained of in four cases; cough in six; itching in two; visual disturbance in three; tender eyeball and pain on movement of the eyeball in one instance.

nodes may attain considerable size, though pressure symptoms are not the rule.

In addition to splenic and liver enlargement, these organs may also be tender, the spleen us-

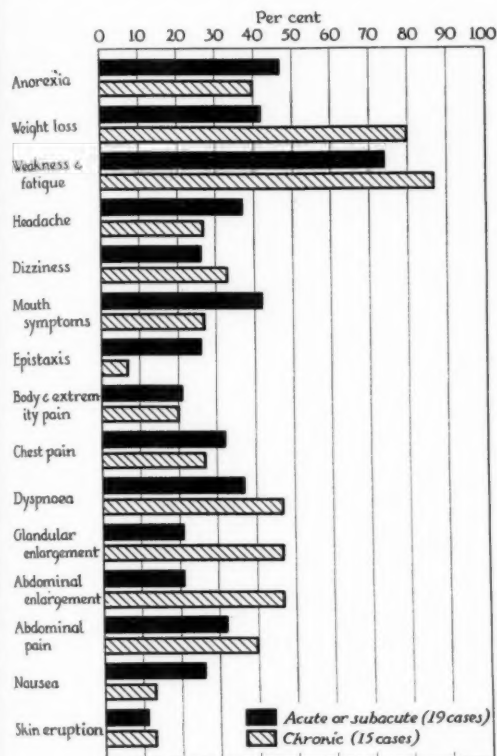


CHART 2. SYMPTOMS

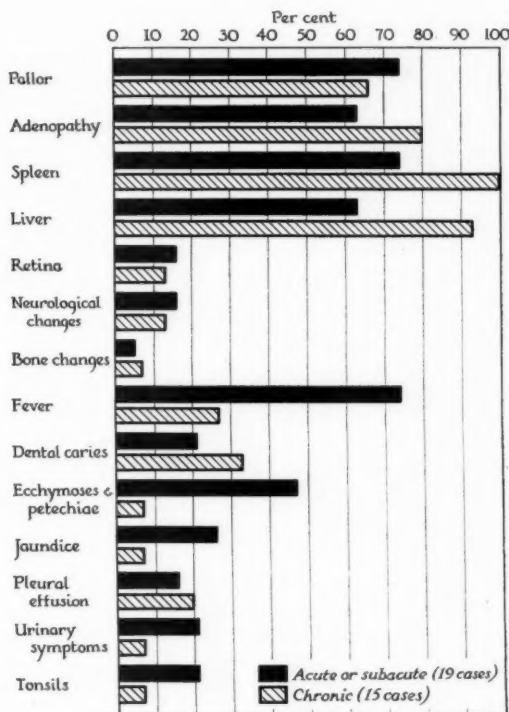


CHART 3. PHYSICAL FINDINGS

It is highly important to pay attention to any skin lesion which may be present, for not infrequently a skin biopsy may be an important factor in determining the true diagnosis.

Priapism, though frequently mentioned, is a symptom which I have never encountered in this disease. Cabot failed to find it in a series of eighty-nine cases.

I have arranged the physical findings in the same general way in Chart 3. There is considerable difference in the degree of glandular enlargement in various parts of the body. The glands are usually discreet, moderately firm, freely moveable, and not attached to the skin or surrounding tissues. Usually the nodes are moderate in size, but not so large as those found in Hodgkin's disease or lympho-sarcoma. Occasionally the mesenteric, retro-peritoneal, and hilus

usually more often so than the liver.

The findings in the fundus oculi are principally engorged veins, with or without hemorrhages, with sometimes white streaks along the vessel walls, and increased tortuosity of the vessels. The peculiar color of the fundus is more often talked about than seen. Some authors estimate the incidence of retinal changes in as much as 65 per cent of cases.

Recent articles have commented upon the frequency of neurological findings. These have been carefully looked for, and not found in nearly the frequency reported by Weiss and Schwab (20 per cent).

Bone changes have not been found with any considerable frequency, although tenderness over the bones has been encountered when no lesion could be demonstrated. Sternal tenderness oc-

curred more frequently in the myeloid types. In one patient symptoms were such as to suggest a possible osteomyelitis. One patient had infiltration of the fourth thoracic vertebra which resulted in a pathological fracture and this same person had areas of lessened density in the cranial tables.

The fever naturally more frequent in the acute group was variable and irregular.

Heart murmurs were frequent, sometimes readily explained by sufficient evidence of heart disease, sometimes explainable by the degree of anemia which was present. Subacute bacterial endocarditis may occur terminally as in sepsis. In one case, a child, a leukemic infiltrate had invaded the heart in such a way as to interfere with the coronary circulation and produce abnormal changes in the electrocardiographic tracing.

Case 1 illustrates the course of a patient with lymphoid leukemia whose course was rather longer than usual, with rather acute manifestations near the termination.

Case 2 illustrates rather typically a patient with reticuloendotheliosis.

Case 3 illustrates a hypocytic leukemia with acute symptoms.

Case 4 illustrates a myeloid leukemia which ran a short course.

It would appear that the greatest diagnostic difficulties consist in differentiation from pernicious anemia, Hodgkin's disease, cancer, benign lymph-adenosis, agranulocytosis, and aplastic anemia.

Conclusion.—A characteristic clinical picture together with typical blood findings readily establishes the diagnosis of leukemia. It is, of course, apparent that the qualitative blood changes are of more importance than the quantitative.

Even on encountering a low rather than a high total leukocyte count, leukemia must be considered, and when there is present adenopathy, enlargement of the spleen and liver, bleeding from the mouth or nose, a progressive downhill course, and a rapidly developing anemia, the chances are that leukemia is almost surely present.

Case Reports

Case 1.—A female, fifty-three years of age. Her father had died at the age of sixty-five of cancer of the stomach.

The patient had had no important illnesses. In

1914, she had a "nervous break-down," was in bed for eight months. Since 1923, she had gastrointestinal symptoms, consisting of pain and tenderness in the right upper quadrant, bloating, gaseous eructations, some nausea, and occasional vomiting. There was a tendency to constipation. There had been no jaundice. Menopause had occurred in 1925. She complained of weakness and fatigue, headache, some dizziness, slight dyspnea and palpitation on exertion. Patient had suffered from frequent upper respiratory tract infections.

Physical examination: The patient was well nourished, her color good. Some very small cervical nodes were palpable. Number of non-vital teeth were present. Heart and lungs were normal. The liver was not enlarged, the spleen not palpable. Fundus examination was negative. X-ray examination gave evidence of an abnormally functioning gallbladder.

The patient was seen and examined in 1927 by Dr. L. A. Nippert, who furnished the following findings: Hemoglobin, 77 per cent; erythrocytes, 4,540,000; leukocytes, 40,000, 17 per cent of which were polymorphonuclears and 83 per cent lymphocytes, "all cells appearing mature and not those usually observed in leukemia."

I observed the patient during the years of 1929 and 1930, during which time her hemoglobin varied from 88 per cent to 83 per cent, the red blood cells from 3,870,000 to 4,480,000, and the total leukocytes from 22,000 to as high as 51,000. Most of the cells were lymphoid in character, but after much study the conclusion was reached that the condition was that of lymphatic leukemia. The Wassermann reaction was negative. The urine was always normal. The stomach contents showed normal findings, and the electrocardiographic tracing was normal. The basal metabolic rate was minus 21 per cent. During this time she was observed over a period of one month by Drs. Giffin and Roundtree, who satisfied themselves that the condition was leukemia, a skin biopsy showing changes characteristic of that condition. While the patient was not incapacitated, her weight diminished from 175 pounds to 157 pounds.

The patient was not observed from 1931-1933, but it was learned that she was receiving x-ray treatments. In August, 1933, she had some dental extractions and there was no excess bleeding.

In 1934, and up to March, 1935, she was observed by Dr. J. Davis of Minneapolis, who reported the findings as follows: Patient had lost in weight to 125 pounds by March, 1934. There was general lymph adenopathy, and the spleen was enlarged and palpable. Hemoglobin was 68 per cent, red blood cells 3,000,000, leukocytes 47,000. From the blood smears, the diagnosis was obvious, there being many immature forms. From this time the condition was progressive, the hemoglobin going down to 20 per cent, red blood cells 1,000,000, leukocytes 57,000 on February 28, 1935. There was considerable bleeding from the nose and mouth. Transfusions and the administration of liver did not modify the course, and the patient died March 1, 1935.

Diagnosis: Chronic lymphatic leukemia.

LEUKEMIA—PEPPARD

Comment.—Information is available concerning this patient over a period of approximately eight years. It is not uncommon to observe some of these patients with more or less characteristic blood changes, but with all relatively little impairment of the state of their general health. In the present instance the condition lasted longer than the average duration of about four years. Near the termination the symptoms become more acute.

Case 2.—R. L., a female, forty-nine years of age. Family history was unimportant.

The patient's general health had been good. Appendectomy had been performed in 1910. Radium had been applied to the pelvis in 1932, and she was said to have been anemic since 1932.

Following dental extraction, May 21, 1935, she bled profusely, was faint and weak, the face and jaw swelled, and there was a bad odor to the breath and a bad taste in the mouth. A chill occurred May 27, 1935, and the following day she entered the hospital.

Examination: The patient appeared well nourished; weight, 132 pounds. There was a marked pallor, swelling of the left lower jaw, but no fluctuation. Blood oozed from the gum margins, and there were large necrotic areas in the mouth. The regional lymph nodes were enlarged. Heart and lungs were normal. The abdomen was distended and the liver and spleen were not palpable. There was no general adenopathy.

Laboratory: hemoglobin at the time of admission was 37 per cent, red blood cells 1,500,000, leukocytes 1,000. Subsequently, the hemoglobin varied between 40 and 46 per cent. Three transfusions were given, and the red count was elevated to as high as 2,700,000. The leukocyte count varied from as low as 300 cells to as high as 2,400, the polymorphonuclear percentage generally about 20. There was variation in size and shape of the red cells and a few early forms were seen. There was some evidence of regeneration. The platelet count was 190,000 and on another occasion 250,000. The blood culture was negative. Smears from the mouth showed Vincent's organisms.

Course: Fever ranged from 101 to 104.6 degrees, the pulse rate increasing in proportion to the temperature. There was much nausea, headache and weakness, and constant oozing from the mouth and gums. X-ray of the jaw showed infected area in the region of the tooth socket. There were ecchymoses and on June 5th frank hematuria. On June 9, hemiplegia, extensive retinal hemorrhage and coma supervened. Death occurred on this day.

Autopsy: Peritoneum, pleura, and pericardium were negative. The heart weighed 250 grams, and was entirely normal. The lungs were normal. The spleen weighed 250 gms., its cut surface appeared normal, and there was hyperplasia of the reticulum. The right kidney weighed 200 gms., the left was 175 gms., and they were normal except for blood in the pelvis. There was no general adenopathy. The rib marrow was not

gelatinous; the marrow of the middle of the femur was yellow but section shows hyperplasia, with mainly large round cells which showed no differentiation toward mature granulocytes or erythrocytes. There was no infiltration of the liver, lung, or kidneys.

Blood smears were reviewed by Dr. Downey who found the red blood cells and lymphocytes normal. A number of cells were found with rounded or indented nuclei with chromatin network resembling myeloblasts, the same as those found in the splenic sinuses and bone marrow which were termed differentiated reticulo-endothelial cells.

Diagnosis: Reticulo-endotheliosis (Monocytic leukemia).

Comment.—The extensive necrosis in the mouth is quite characteristic of this type of leukemia, the course of which is acute. The profound anemia serves to differentiate this condition from agranulocytosis. The head was not opened at autopsy, but quite likely there was a terminal cerebral hemorrhage.

Case 3.—A. B., a male, thirty-one years of age. Family history unimportant.

History: This man had had childhood diseases without complications, influenza in 1918, gonorrhea in 1921, and fibrinous pleurisy in 1929. Syphilis was denied.

In October, 1935, he had an attack of abdominal pain, probably unaccompanied by fever, and constipation, and a surgeon considered the possibility of intestinal obstruction. After ten days he returned to work, was not up to par, but had no specific complaints.

On April 2, 1936, he experienced a moderately severe epigastric pain, dysphagia, a sense of pressure in the upper abdomen with tenderness, and loose bowel movements. There was a ten pound weight loss in two weeks. He complained of weakness, nocturia (1-3), dark urine, throat irritation, cough, and whitish sputum.

On April 12, 1936, he entered the hospital.

Examination: Well nourished, weight 172 pounds, slight pallor, conjunctivæ icteric, ecchymoses, no general adenopathy. Lungs showed a shading at the left base, impaired resonance, over the lower third of the right base, diaphragmatic excursion, no pleural rubs. Heart normal, blood pressure 118/80. Liver extended 6.5 cm. below the tip of the ensiform, 5 cm. below the costal margin in the mid-clavicular line. Spleen extended half way from the costal margin to the umbilicus. A slight amount of peritoneal fluid was present. Rectal examination was negative.

Laboratory: Urine—the only significant finding was that of 4 plus urobilin and urobilinogen. The icterus index was 23. There was no increased fragility of the red cells. Bleeding time and clotting time were normal. One blood culture remained sterile. Blood Wassermann was negative. The hemoglobin, on admission, was 82 per cent, after two weeks 51 per cent, and thereafter varied between 55-48 per cent. Red blood count was 4,400,000, later reduced to 3,420,000. Leukocyte count varied from 2,900 to 3,400; differential: polymor-

phonuclears 77 per cent, lymphocytes 15 per cent, monocytes 8 per cent. One normoblast was observed, and no early leukocyte forms were seen at any time. Sputum was negative for tubercle bacilli. Twenty-five mgm. of urobilinogen was excreted in the urine in twenty-four hours; 350 mgm. urobilinogen in the stool. Cystoscopic examination and pyelograms were negative.

Autopsy: The heart weighed 250 gms. and there was a slight thickening of the edges of the mitral cusps, but no ulcerations nor fresh vegetations. The other valves were normal. The coronary vessels were normal. A minimal atheroma of the aorta was present.

The lungs were normal. At the hilum of the right lung was a mass of glands, $12 \times 8 \times 6$ cm.

The spleen weighed 1,350 gms. The external and cut surfaces were studded with a large number of whitish firm nodules up to 5 cm. in diameter.

The liver weighed 4,050 gms., and was congested. There were numerous white nodules throughout, similar to those found in the spleen.

The right kidneys weighed 250 gms., the left 300 gms. They were pale and firm, and a 4 mm. nodule was present in the cortex of the right kidney.

Microscopic examination of nodules in the liver and spleen showed masses of cells resembling lymphocytes; much mitoses. The mediastinal lymph nodes showed leukemic metaplasia and also some necrosis. The kidney contained no leukemic infiltration in the parenchyma, but a subcapsular leukemic nodule. Imprint preparations from spleen and liver nodules showed large numbers of immature lymphocytes. Bone marrow of ribs and sternum appeared hyperplastic. On review of blood smears, no abnormal cells were found.

Course: There was irregular fever, with diurnal variations of from one to three degrees, gradually increasing from 100 degrees F. to 102. Pulse rate followed the temperature curve, increasing from a level of about 100 to 120. There was increasing weakness. There were attacks of abdominal pain with increasing distention of the abdomen. The liver and spleen enlarged. Ascites and dependent edema developed. There was sore mouth and nose bleed on occasion. The patient coughed and expectorated a clear mucoid material. The jaundice varied in intensity. He was given a transfusion of citrated blood on April 28, and on May 5, but became weaker and died on May 8.

Diagnosis: Aleukemic lymphoid leukemia.

Comment.—This patient died approximately thirty-six days after the development of his acute symptoms. The symptoms of cough and expectoration as well as difficulty in swallowing were undoubtedly related to the mediastinal glandular enlargement. Jaundice is not infrequently observed in the leukemias. It should scarcely be necessary to call attention to the fact that the term aleukemic refers to the absence of characteristic early leukocytic forms of cells in the circulating blood, and does not at all pertain to the total number of leukocytes. The not infre-

quent misapplication of the term has been one of the reasons for various attempts at altering the nomenclature, bringing forward such terms as hypocytic, hypercytic and normocytic to designate low, high, and normal total leukocyte counts. No especial need is seen for changing the terminology. Proper use of the present terms, with the necessary qualifications, very well suffices.

Case 4. (Courtesy of Dr. R. L. Sherer).—Male, sixty-two years of age. Family history was unimportant. Previous health had been good.

Acute onset occurred May 14, 1936, with nausea, vomiting, weakness and diarrhea. There were some body pains and chest pains, with increasing weakness and loss of weight.

Examination: A pallor, with slight icteric tinge was present. Fundus oculi were negative. There was moderate atherosclerosis. Blood pressure 140/90. Heart and lungs were normal. The spleen and liver were palpable and both moderately enlarged. Tendon reflexes were normal. Vibration sense was diminished over the lower extremities. The electrocardiographic tracing showed myocardial degeneration.

The patient entered the hospital June 2, 1936.

Laboratory findings: Hemoglobin was 45 per cent, red blood cells 1,980,000, white blood cells 5,800, 52 per cent of which were lymphocytes. There was considerable albuminuria with cylindruria. Test meal showed achlorhydria before and after histamine. Blood urea nitrogen on one occasion was 10 mgm., later as high as 29 mgm. Blood culture was negative. Subsequently, the hemoglobin varied between 40-35 per cent. There was little change in the number of red cells. After one week's time the total leukocyte count increased to 13,000; on June 16, it was 16,000, and on June 20, 20,000. There was gradual progressive increase in the immature forms of white cells, and although the anemia, the appearance of icterus, the achlorhydria, and the diminished vibration sense first suggested pernicious anemia, later study of the blood smears made the diagnosis apparent.

There was temperature variation from 98 to as high as 101 degrees. The patient expired June 24, 1936.

Partial autopsy only could be obtained. The spleen weighed 750 grams. The kidneys weighed 200 and 235 gms. The liver appeared to be of about normal size and weight. Sections of these organs showed leukemic infiltration. **Diagnosis:** Acute myeloid leukemia.

Comment.—In the present instance, as in not a few others, pernicious anemia was first suggested, not only by the general appearance of the patient, but by certain of the laboratory findings. While during the first week, treatment with liver extract produced a reticulocyte increase to 9 per cent, there was no improvement in the red blood cells, nor the hemoglobin.

A CASE OF WOHLFAHRTIA VIGIL CUTANEOUS MYIASIS IN MINNESOTA

CHARLES VANDERSLUIS, M.D., and D. D. WHITEMORE, M.D.

Bemidji, Minnesota

"**C**UTANEOUS myiasis," as was so aptly stated by Walker,¹⁰ "is an infestation of the skin and subcutaneous tissues by the larvæ of certain species of flies which feed upon these tissues during their period of growth, causing great suffering and often leading to secondary bacterial infection." With the invaluable assistance of Drs. William A. Riley and Reed O. Christenson of the Department of Entomology, University of Minnesota, we are able to present a proven case of cutaneous infestation of a young infant in Minnesota by maggots of the flesh fly *Wohlfahrtia vigil*.

M. B., a female infant of two and a half months, living in Crookston, Minnesota, presented a few small red pimples on her upper chest the morning of July 10, 1937. The mother observed that they became larger during the day, but she considered them due to the heat. Towards night the infant became irritable and began to cry. She cried all night in evident pain. She was brought to Bemidji on a visit the next morning, continuing to cry violently. The pimples on her chest became larger, were capped by yellowish white heads, and were surrounded by areas of redness and induration. The inflammatory bases of many closely grouped lesions on the right upper chest fused. That noon the mother suddenly noted lively crawling worms emerging from the pimples on the infant's chest, and she rushed the baby to us in great excitement. We noted about fifteen red macules, ten of them closely grouped on the upper right chest, and the rest scattered singly in the left axilla, left scapular region and left loin. The single lesions were like large, well developed acne pustules. The maggots were emerging from the confluent lesions on the upper chest, occupying an area about 6 x 8 cm. These lesions were the most advanced and seven or eight of them presented, at the apices, cleanly punched-out holes measuring about 3 mm. across. Each was surrounded by a small red area, and the deeper surrounding tissue was indurated. These holes contained the maggots. In most of the openings only one maggot was present but in several of them two and three were wriggling deep in the infant's hypoderm. In some areas the skin was undermined by tunnels between the holes, leaving but a fibrotic bloodless skeletal subcutaneous network. The maggots were actively feeding on the infant's tissues and when expressed or picked from an opening would rapidly crawl across the skin and enter another if possible. In some of the lesions not quite ruptured, maggots could be seen moving about under the inflamed necrotic epidermis. At least one maggot could be expressed from

each lesion, and such was the procedure followed in treatment.

On the anterior chest wall several free incisions were made to open up the tunneled hypoderm. The maggots



Fig. 1. Infant in authors' case.

were white, round, and segmented, measuring 4 to 8 mm. in length, and each had a black speck at the head. All of them, numbering about twenty, were removed from the baby and several placed in alcohol-formalin solution for study. It was noted that they lived several minutes in this preservative. The infant went to sleep immediately after all the larvæ had been removed. We placed azochloramid packs on the lesions and were forced to lose contact with the baby, due to the parents' anxiety to return to Crookston. Dr. W. F. Mercil saw the patient there and reported finding no more maggots. The child recovered uneventfully with treatment directed to clearing up the secondary inflammation from pus organisms (undoubtedly staphylococcus). The photograph represents the infant about one week following removal of the larvæ. Dr. Reed Christenson identified them as second stage larvæ of the Sarcophagid fly, *Wohlfahrtia vigil*.

Cutaneous myiasis is a medical curiosity in temperate parts of the United States, although it is not infrequent in the southern states. For

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Cutaneous myiasis is a medical curiosity in temperate parts of the United States, although it is not infrequent in the southern states. For

many years it has been considered that the most common cause of human myiasis in the Western World is a Sarcophagid fly, *Cochliomyia macellaria*, which has been reported from Canada to the Argentine. It has been thought to have a "screw-worm" larva. It is somewhat larger than the housefly and deposits numerous eggs in open wounds, or in the nose or ear of individuals with a purulent discharge or odor which attracts the adult flies. Harris,⁶ who reported a number of cases of screw-worm infestation, says that the larvæ may issue within a short time and begin at once to feed and burrow into all structures and cavities of the head, migrating into the eyes, middle ear, and brain, destroying tissues and causing infection and gangrene of soft parts and necrosis of bone. The larvæ then desert the host to pupate in five to fourteen days, leaving behind widespread devastation. Discharge of larvæ, and sero-sanguinous fluid, and the odor of wet gangrene are listed as the cardinal symptoms of infestation. The mortality is variously reported to run from 15 to 85 per cent.

In 1933, Cushing and Patton² made the astonishing discovery that the true "screw-worm" is the larva of a related but entirely distinct species, which they proposed to call *Cochliomyia americana*. It is this species which invades living tissue after entering through some wound. For a half century or more, *Cochliomyia macellaria*, a secondary invader, has been held responsible for invasions of living tissue which were really due to *C. americana*. The resultant confusion in medical and veterinary literature is such that case reports of the past must all be regarded with suspicion.⁸

Another family of flies, the *Cæstridæ*, includes species whose larvæ are parasitic in animals and, occasionally, in man. Of these the bot-fly larvæ are commonly found in the stomach and intestine of horses. The eggs are laid on the hairs of the host and, when licked up, the larvæ enter the alimentary canal, where they remain until mature, when they are discharged in the manure and enter the ground to pupate. In the rare cases of human infection the larvæ are deposited on the skin, hatch, and penetrate the skin, moving about under the surface superficially and producing a characteristic creeping eruption, larva migrans, with narrow, slightly elevated, red, linear lesions. Its occasional resemblance

to scabies has been remarked. *Gastrophilus* is the most frequently cited causative genus.

Very different is the biology of the warble flies of cattle.⁴ Here the eggs are likewise laid on hairs but the hatching larvæ bore into the skin of the animal host and migrate for months in the body tissues before they come to lie under the skin of the back in mid-winter. The rare human infections do not present the raised inflamed line of creeping eruption, but the larvæ migrate in the deeper tissues, occasionally manifesting their presence by tumor-like swellings and severe pain along the path of migration. Such a traveling lump may surpass the size of a pigeon egg, have the appearance of a furuncle, and, at the end of its migration, the warble stage, present a central opening on its surface in which the larva can be seen "appearing and disappearing after the manner of a jack-in-the-box."¹¹ This disease has been variously named as dermal myiasis, subcutaneous myiasis, and ox-warble disease. The larvæ of *Hypoderma lineata* and *H. bovis* have been identified as invaders in lesions of the above type. The so-called human bot *Dermatobia hominis* enters the unbroken skin (Dunn⁹) and produces similar painful tumors (non-migrating).

Wohlfahrtia vigil as a human and animal parasite is little known about and has been found only in Canada and the northern part of the United States, due largely to the work of E. M. Walker¹¹ of the University of Toronto. Brauer and von Bergan Stamm in 1889 erected the genus *Wohlfahrtia* for certain flesh flies of the family *Muscidæ* formerly included in the genus *Sarcophila*. *W. magnifica*, the type species, is well known as a parasite of man and various domestic animals in Europe, particularly Russia, and has been considered the European analogue of our screw-worm fly. In all these cases the larvæ are noted to feed upon the mucous membrane and deeper tissues of the nose, gums, ear, and even the eye, but Walker finds no mention made of the larvæ ever penetrating the healthy skin, as must have occurred in the cases of infestation by *W. vigil*.

Nothing had been known of the larval habits of the North American species of *Wohlfahrtia* until the discovery of *W. vigil* as the cause of human cutaneous myiasis in Toronto in 1919 by Walker.¹¹ In 1931 he reported a total of sixteen cases having come to light since 1919, all

in Canada and the northern United States. In 1934 there were four additional cases in Toronto besides 180 proven cases of *Wohlfahrtia myiasis* in dogs, cats, foxes, milk, ferrets, and rabbits.

Dr. A. A. Kingscote of the Ontario Veterinary College, who reported the animal cases, says that "in very small animals from five to twenty larvae will cause death usually within about ten days." There are isolated human cases reported in New York (Felt, 1925), New Hampshire (Sanders, 1928),⁹ Colorado (Knowles, 1925),⁷ and lately North Dakota (Gertson, 1933),⁵ the latter place only a few miles from Crookston. Dr. J. M. Aldrich, of the National Museum, writes: "The species ranges from Nova Scotia to North Dakota, or rarely further, but west of the Rocky Mountains it seems to be replaced by . . . *Wohlfahrtia meigenii* Shiner," a form which is not parasitic in the manner *W. vigil* is. Our case in Crookston appears to be the first reported in Minnesota, although a suspicious case was observed in the region of Duluth recently. Dr. Riley reports the death of many young mink, young foxes, and some cases of very young rabbits from the attacks of larvae in this region, and he urged upon us the report of this human case.

All but one of the human cases of myiasis have occurred in infants less than one year of age, the average being two to five months. Felt reported the adult case of a conjunctival cyst filled with "living maggots provisionally identified as *W. vigil*." The small abscess-like lesions develop most commonly on the neck, chest, shoulders, and arms, showing our case typical in this respect. Lesions have also been observed on the palm, navel, cheek, and eyelids. In Walker's original words: "The small opening at the apex of the lesion is so strongly suggestive . . . of pus that on superficial examination a group of lesions might readily be considered impetigo; in fact, the diagnosis of impetigo was made erroneously in at least one of the cases reported. On closer examination it is readily seen that what appeared to be pus is, in reality, the posterior end of the larva. This may be seen to be moving . . . if pressure is exerted the larval body may be forced out. It can be seen to work its way by a wriggling movement along the skin surface. In most cases about twelve or fourteen of these lesions were present,

each with an external opening, and each containing one or more larvae. In the earlier stages a slight macular rash may be present and at this time the young larvae, 2 to 3 mm. long, may be found wandering over the surface of the skin. It thus appears that the larvae may penetrate the skin at points distant from those where they were deposited by the parent fly. The development of the larvae is very rapid, though variable. Scarcely more than 2 mm. long when born, they reach a length of about 20 mm. in from four to twelve days. In another day or two they emerge from the skin and drop to the ground and burrow into the earth and become puparia. After about eighteen days in this resting stage they emerge from the ground as adult flies. Most of the cases of myiasis due to this fly have occurred in June. The adult flies have been taken at various times during the summer months and have been found from the New England States to Alaska.

Norma Ford,⁴ through her studies of *W. vigil* in the field and in the laboratory, has learned much about the habits of the species. It is closely related to the house-fly and the blow-fly or "blue bottle," but unlike these diptera it does not breed in decomposing organic matter but rather is parasitic on living tissues. Experimentally it can be observed to prefer the eye of a living guinea pig to liver. Unlike the majority of common flies it deposits living larvae or maggots instead of eggs, although rarely it has been observed to lay eggs when unduly excited or attracted to a favorable spot on a living animal. In feeding experiments it has been noted to pass up meat in favor of milk, sugar, and flowers. The flies are not attracted by the odors of decomposing substances. Ford found that all of the infested infants had been sleeping unprotected out-of-doors and that many had been living near a railroad track. She found that the flies were attracted by warmth and so stimulated to larviposition; thus she explains their greater activity near a warm railroad track in the summer. She also noted the greater activity of the females in the absence of direct sunlight, an interesting observation in view of the fact that a child is usually placed in a cool shady place when left outside. She remarked that in no case had the fly been known to enter houses. In our case an exception may have occurred, since the

mother states that at no time in the week preceding infection had the infant been left out-of-doors. The maggots were estimated to be about three days old. The nearest railroad track was three-fourths mile away.

If additional cases are encountered it is suggested that some of the living maggots be placed on raw meat and also some preserved in 70 per cent alcohol and sent to an entomologist. Again we wish to express our gratitude to Dr. W. A. Riley for his interest and many helpful notations.

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RELATIVE VALUE OF THE DIAGNOSTIC PROCEDURES IN THE ALLERGIC CHILD*

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CUTANEOUS tests and trial or elimination diets play an important part in the diagnosis and treatment of allergic disorders of the child. Much has been written concerning the value of dermal testing in determining the causative agent in allergic disease. Early reports in the literature were chiefly concerned with the scratch method. The introduction of the intracutaneous method marked the onset of a controversy as to the relative merits of the two main methods of cutaneous testing. The pioneer investigators used extracts and solutions which had been crudely prepared and they differed greatly in their testing technic. It is not surprising, therefore, that these workers could come to no significant agreement on the matter.

Today the powdered and fluid extracts are definitely more potent than they were a decade ago and their quality will continue to improve. The powdered extracts need no longer be used for the scratch method. Glycerinized concentrated liquid extracts are now available. This material has led to the introduction of another technic. In place of the customary scratch through the upper layer of the epidermis, oblique and shallow punctures are made. This procedure is referred to as the pressure-puncture method of cutaneous testing. It is a relatively painless procedure when properly performed and

small children will tolerate it with little complaint.

The pressure-puncture method was adopted by the staff of the Pediatric Allergy Clinic of the University Hospital, the following technic being employed. The skin is cleansed with alcohol or ether or both and allowed to dry. The various glycerinized fluid extracts are then expelled from the glass capillary tubes upon the cleansed skin at intervals of about four centimeters. With a sterile sewing needle held nearly parallel with the skin, four to eight oblique pricks or shallow punctures are made into the epidermis by pressing the point of the needle through each drop of extract. A new needle is used for each test. The punctures are confined to an area not more than three millimeters in diameter.

Sufficient fluid extract to produce a positive reaction in susceptible children is carried into the epidermis by the multiple punctures and in a few minutes the excess fluid on the surface of the skin is gently wiped off. A similar test is carried out with a control glycerine solution and only those reactions in the test sites which are distinctly greater in intensity than that resulting from the control test are considered positive. The positive reactions (urticarial wheal surrounded by a zone of erythema) usually appear in sensitive patients in twenty to thirty minutes.

Three hundred consecutive cases of allergy in

*From the Allergy Clinic and Service of the Department of Pediatrics, University of Minnesota. Presented before the Fall meeting of the Southwestern Minnesota Medical Society at Fulda, Minnesota, October 7, 1937.

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TABLE I. CLINICAL VALUE OF THE PRESSURE-PUNCTURE CUTANEOUS TESTS IN 300 ALLERGIC CHILDREN

Allergic Disease	No. of Cases	Results of Treatment Based on Tests			
		Good		Poor	
		No. Cases	Per Cent	No. Cases	Per Cent
Eczema	82	27	33	55	67
Allergic Rhinitis	36	6	17	30	83
Hay fever	44	35	80	9	20
Bronchial Asthma	120	74	62	46	38
Urticaria and Gastro-intestinal Allergy	18	2	1	16	89
Total	300	144	48	156	52

TABLE II. CLINICAL VALUE OF THE ELIMINATION DIETS IN THE 147 ALLERGIC CHILDREN FAILING TO RESPOND TO THE PRESSURE-PUNCTURE CUTANEOUS TESTS

Allergic Disease	No. of Cases	Results Obtained from the Various Diets			
		Good		Poor	
		No. Cases	Per Cent	No. Cases	Per Cent
Eczema	55	19	35	36	65
Allergic Rhinitis	30	8	27	22	73
Bronchial Asthma	46	2	4	44	96
Urticaria and Gastro-intestinal Allergy	16	10	63	6	37
Total	147	39	27	108	73

the child were tested by the method just described. The children ranged in age from six months to fifteen years. In 144 cases or 48 per cent the tests were of definite value in determining the exciting cause in the various allergic manifestations. The best results were obtained in hay fever and bronchial asthma. The causative agent was easily found in 80 per cent of the children with hay fever and in 62 per cent of those suffering with asthma. Only about 33 per cent of the cases of eczema gave positive skin tests which were found to be of clinical significance. Allergic rhinitis, urticaria and gastro-intestinal allergy made a poor showing. The results are summarized in Table I.

In 156 cases the pressure-puncture tests were of no value, and these children were not subjected at once to the intracutaneous testing. This method is painful and often rather difficult to

perform properly on the child. Therefore, the elimination diets were tried. The nine children with hay fever were omitted, leaving 147 cases. It was found that milk, cheese, egg, whole wheat, white potato, chocolate, tomato and orange were most frequently the offending foods. In thirty-nine cases the response to the trial diets was satisfactory. The best results were in urticaria, with eczema, and allergic rhinitis next. Those in bronchial asthma were the poorest, as may be observed in Table II.

The intracutaneous tests were next considered. The food allergens were placed in various groups in order to simplify testing but the inhalants were not mixed together. Pollens were excluded and therefore the nine cases of hay fever unsuccessfully treated were not tested. One hundred and eight children received the intradermal tests, the following technic being employed. The

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TABLE III. CLINICAL VALUE OF INTRACUTANEOUS TESTS IN 108 CHILDREN FAILING TO RESPOND TO THE PRESSURE-PUNCTURE TESTS AND ELIMINATION DIETS

Allergic Disease	No. of Cases	Results of Treatment Based on Tests			
		Good		Poor	
		No. Cases	Per Cent	No. Cases	Per Cent
Eczema	36	2	6	34	94
Allergic Rhinitis	22	19	86	3	14
Bronchial Asthma	44	17	39	27	61
Urticaria	6	—	—	6	100
Total	108	38	35	70	65

TABLE IV. COMPARISON OF THE TESTS OBTAINED WITH THE PRESSURE-PUNCTURE AND INTRACUTANEOUS TECHNICS IN THIRTY-EIGHT CHILDREN RESPONDING FAVORABLY TO TREATMENT BASED ON THE LATTER METHOD

Case No.	Age in Years	Positive Pressure-puncture Tests	Positive Intra-dermal Tests	Allergens of Clinical Value
Allergic Rhinitis				
1 S.J.	10	Vegetables	Cereals, vegetables	Cereals
2 R.D.	6	Cereals	Cereals, vegetables	Vegetables
3 J.B.	9	Dog dander, house dust	Feathers, house dust	Feathers
4 N.H.	9	Cereals	Feathers, orris root	Feathers
5 W.L.	7	Milk, cereals	Milk, cat and dog danders	Dog dander
6 T.B.	14	Feathers	Feathers, house dust, orris root	Feathers, house dust
7 L.E.	5	Cow dander, feathers	Banana, grape, pineapple	Banana, grape
8 S.S.	4	House dust	Orris root	Orris root
9 W.E.	11	Vegetables	Egg, cereals, vegetables	Cereals, vegetables
10 P.B.	9	Many weak reactions	House dust, orris root	Orris root
11 R.M.	13	" " "	Milk, house dust	House dust
12 N.S.	13	" " "	Cereals, vegetables	Cereals, vegetables
13 H.M.	13	" " "	Cat and dog danders	Dog dander
14 L.N.	13	" " "	Animal danders, orris root	Orris root
15 B.W.	11	" " "	Milk, cereals, vegetables	Milk, cereals
16 I.A.	4	" " "	Milk, vegetables	Milk, vegetables
17 R.R.	10	" " "	Wool, house dust	House dust
18 B.S.	10	" " "	Wool, feathers	Feathers
19 W.B.	15	" " "	Apple, feathers	Apple, feathers
Bronchial Asthma				
1 B.S.	12	Cat dander, feathers	Milk, cat dander, feathers	Milk, feathers
2 R.F.	10	Silk	Animal danders, feathers	Feathers
3 L.B.	15	Wheat, peanut	Milk, cereals	Milk, peanut
4 U.L.	10	Cereals	Cereals, vegetables, house dust	House dust
5 L.R.	12	House dust, silk	House dust, orris root	Orris root
6 A.A.	12	Cereals, vegetables	Vegetables, mustard, chocolate	Chocolate, mustard
7 N.S.	8	Feathers, house dust	Egg, vegetables	Egg, feathers
8 E.B.	6	Egg	Animal danders, house dust	House dust
9 D.D.	9	Many weak reactions	Milk, feathers	Feathers
10 L.S.	4	" " "	Cereals	Cereals
11 J.S.	11	" " "	Vegetables, chocolate, house dust	Chocolate, house dust
12 R.F.	9	" " "	Feathers, house dust	House dust
13 D.A.	7	" " "	House dust	House dust
14 M.N.	11	" " "	Chocolate, feathers	Chocolate, feathers
15 J.H.	6	" " "	Animal danders	Dog dander
16 W.R.	8	" " "	Cat dander, house dust	Cat dander
17 A.N.	4	" " "	Milk, fruits, feathers	Feathers
Eczema				
1 D.R.	2	Meats	Wool	Wool
2 H.I.	12	Many weak reactions	Vegetables, chocolate	Chocolate

outer aspect of the arm or the anterior aspect of the thigh is used. The skin is cleansed with alcohol and dried. A graduated 1 c.c. (tuberculin) syringe with a hypodermic needle of 27 gauge and a half inch in length is selected. After loading the syringe and ejecting all air bubbles, the needle is inserted into the corium through the integument. Not more than 0.01 c.c. of the sterile extract is injected. Control tests are similarly made with sterile extracting fluid. The tests are observed and read within ten to fifteen minutes.

In thirty-eight children good results were obtained by treatment based on the intracutaneous method of testing. Excellent results were obtained in the allergic rhinitis cases, the causative agent being found in 86 per cent of the children. Assistance was obtained in determining the underlying cause in 39 per cent of the children suffering with bronchial asthma. In eczema, however, the results were poor and the tests were of no value in the few remaining cases of urticaria. Table III present the results.

Interesting observations were made in the thirty-eight children responding favorable to the treatment based on the results of the intracutaneous technic when the positive reactions were compared with those previously obtained with the pressure-puncture method. The intradermal tests gave sets of positive reactions which often did not correspond very closely with the positive tests of the pressure-puncture technic. Patients sensitive by skin testing to egg, milk or cereals by one method were found to give positive reactions to meats, vegetables or fruits by the other method. Food sensitivity by the pressure-puncture technic was found to be supplemented or replaced by inhalant sensitivity, by the intracutaneous technic, or the reverse might be true. For the sake of economy and clearness the data are summarized in Table IV. The children with definite positive tests by both methods are listed first and are followed by those in whom the pressure-puncture tests gave weak reactions to many allergens.

Incidentally the remaining seventy children in whom the intracutaneous tests were of no assistance in determining the cause of the allergic condition were subjected to less specific forms of treatment. In the cases of eczema, crude coal tar or its derivatives were used extensively. The orders concerning the application of the tar

were properly carried out in twenty-four children and fairly satisfactory relief was obtained, leaving ten children in whom the eczema was not controlled. The children with bronchial asthma were again examined and, in view of the poor response to the cutaneous tests, infection was now considered the most important cause of the asthmatic attacks. Tonsillectomy and adenoidectomy together with puncture and irrigation of the maxillary sinuses in some of the children was recommended. The operation was followed by prompt relief in eleven children, leaving sixteen cases in whom all forms of treatment were unsuccessful. The removal of the tonsils and adenoids gave relief to four of the six remaining children with urticaria and to the three with allergic rhinitis.

Summary and Conclusions

Three hundred cases of allergic disease in the child were subjected to a rather thorough investigation involving the various acceptable diagnostic procedures. This study yielded data of considerable value in determining the proper method of diagnosis and treatment for each allergic disorder.

First, the pressure-puncture cutaneous tests using glycerinized concentrated liquid extracts were applied to all the children. This technic was found to be tolerated by children of all ages from infancy through puberty.

1. The results of the treatment based on the positive reactions were satisfactory in 144, or 48 per cent, of the cases.
2. The procedure was of greatest value in hay fever and bronchial asthma, and of little value in allergic rhinitis, urticaria, and gastro-intestinal allergy.

Second, the elimination diets were tried. Excluding nine cases of hay fever, the diets were given to the remaining 147 children.

1. Thirty-nine of the cases, or 27 per cent, responded favorably.
2. The best results were obtained in urticaria and gastro-intestinal allergy. Only one-third of the cases of eczema and one-fourth of the cases of allergic rhinitis were helped by the diets. Little assistance was secured in bronchial asthma.

Third, the intracutaneous tests were applied to the 103 children who did not respond to the trial diets.

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1. Treatment based on the results of this technic was satisfactory in thirty-eight, or 35 per cent of the cases.
2. The procedure was of greatest value in allergic rhinitis, and assistance was obtained in determining the causative agent or allergen in 39 per cent of the cases of asthma. Eczema made a poor showing.

These observations indicate that the allergic child could be treated with a minimum of time

and effort if some attention was given to the fact that each allergic disease has a diagnostic procedure or procedures to which it responds best. In eczema the elimination diets and pressure-puncture tests are of greatest value; in allergic rhinitis, the intracutaneous tests; in hay fever, the pressure-puncture tests; in bronchial asthma, the pressure-puncture and intracutaneous tests; and in urticaria and gastro-intestinal allergy, the elimination diets.

CASE REPORT

ACUTE DISSEMINATED LUPUS ERYTHEMATOSUS ASSOCIATED WITH MILIARY TUBERCULOSIS*

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A PARTIAL review of the literature indicates that the association of acute disseminated lupus erythematosus with miliary tuberculosis has been of such relative rarity as to make this case of interest in that respect.

The patient, a male Hawaiian of Japanese extraction, twenty-five years of age, was admitted to the Students' Health Service on May 17, 1937. Prior to this illness, on admission to the University on September 27, 1932, the patient had been given a thorough routine physical examination. The findings at that time had been essentially negative, except for a positive Mantoux test (1-10,000 dilution), which was followed by a routine x-ray film of the chest, reported as negative on January 23, 1933.

History.—The illness began five days before admission, with chills, fever, and a dull ache between the shoulders, which became progressively worse. The patient stated that he had felt fairly comfortable when warm and in bed. Pain and chills had been simultaneous and frequent, but without regularity. Other complaints included occasional paroxysms of non-productive coughing and sensation of "heaviness in the chest."

Signs, Symptoms, and Clinical Course.—Examination on admission revealed a moderately inflamed pharynx, positive findings on the right side of the chest, temperature 104 degrees, pulse 118, and respiration 22. The positive chest findings were decreased motion on the right, dullness to percussion over the right base anteriorly and laterally, and massive showers of coarse, moist rales throughout the right lung above the area of dullness.

These signs and initial symptoms rapidly subsided. By the sixth day, the patient was apparently normal except for persistent constipation and minimal chest findings of a small area of decreased breath sounds and reinforced vocal resonance anteriorly at the right

base and a few scattered sibilant rales posteriorly. The temperature began again to rise and leveled off at an approximate daily variation of 100 to 102 degrees; the constipation persisted; and a punctate erythematous rash appeared over the abdomen (May 27). Again the temperature mounted to an approximate level of daily variation from 102 to 105 degrees for one week (a peak of 105.6 degrees on June 1). The constipation was followed by diarrhea, and the abdominal rash altered to a generalized erythematous maculopapular eruption—most marked on the trunk, but including the buccal mucosa. This rapidly became deeper in hue, morbiliform in character, and frankly coalescent. There was a moderate photophobia but no coryzal symptoms.

This rash faded in color, altered in character, and gradually localized primarily to the neck, face, knees, and elbows (June 3), but remained evident for the extent of the case. Cervical adenitis and mild bilateral palpebral conjunctivitis (similar to the general skin reaction) were noted. The face became edematous with brawny appearing skin, some grayish scaling and a V-line distribution over the neck and butterfly distribution over the nose and cheeks gradually becoming apparent. The temperature moderated but continued fairly constant throughout at an approximate daily variation of maximum peaks of 101 to 103 degrees. About the middle of this course (June 10) there was a very brief period of air hunger and rusty sputum which was probably an untoward therapeutic result. Gastro-intestinal upsets, with nausea and vomiting and an occasional period of diarrhea, were frequent in the latter period of illness. The patient was rational, and cooperative, except for brief periods of occasional delirium late in the afternoons of the last month. Bilateral chest signs were noted during the last month. The patient grew progressively moribund, and showed a profound terminal cachexia.

On August 3, the patient drank one and a half ounces of merthiolate solution—apparently with suicidal intent. When seen by the physician, he was nervous, sweating profusely, responsive and fully aware of the circumstances. The blood pressure was 70/0 and the pulse regular, extremely rapid, weak and

*From the Department of Preventive Medicine and the Students' Health Service of the University of Minnesota. Presented before the Minnesota Society of Internal Medicine, Nov. 8, 1937.

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thready. Following emergency treatment and restorative attempts, signs of acute pulmonary edema developed, and on August 4 the patient expired.

Laboratory Studies.—Chest x-rays taken on May 18, May 25, June 1 and June 3 were all reported negative. One on June 25 showed broadening of the superior mediastinum probably due to motion. One on July 19 showed considerable distortion due to motion, but was reported as probably negative.

Urine analysis of eight specimens throughout the course of illness showed specific gravities of from 1.005 to 1.020, constant light traces of albumin, occasional pus cells, and on three occasions a few casts.

Complete blood counts were done on twenty-two specimens. These showed the white blood count most frequently at 2,400, gradually reaching 6-7000 during the latter days; high relative lymphocytosis, 50 to 75 per cent early, and shifting to a highly polymorphonuclear leukocytosis of 85 to 91 per cent in the later counts; red blood count of 4,000,000, dropping to 3,200,000 before death, and hemoglobin starting at 89 per cent with 63 per cent finally. On one occasion (May 26) the platelets were 106,200.

Sputum was reported negative for pneumococci (types 1-8) on May 17 and June 8, and smears negative for acid-fast organisms on June 8. The urine and feces were reported negative for typhoid and related bacilli on May 28 and 29, and twenty-four hour urine specimen negative for acid-fast organisms, June 8. Blood was reported negative on agglutination tests for typhoid, paratyphoid, dysentery, and tularemia on May 26 and June 3; negative Wassermann, May 28; cultures and pour plates negative at 136 hour on June 1, June 5, and June 7; and guinea-pig inoculation with whole blood reported negative, June 8. Other miscellaneous reports were sedimentation rate on May 26, 1 hour -67 mm., 2 hour -96 mm.; NPN 26.2, June 10, BUN, 10.1, and spectroscopic blood showed evidence of metahemoglobin on June 8.

Therapy.—Other than general measures of dietary support, adequate nursing, etc., the case was subjected to few therapeutic measures. Two blood transfusions of citrated blood were given, one on June 3, of 400 c.c. and the other on June 10, of 300 c.c. Sulfanilamide was tried following the diagnosis of lupus erythematosus and while streptococcal septicemia was suspected. The patient received approximately thirty-two grams in divided dosage over a period of seventeen days. This treatment was initiated with equal quantities of soda bicarbonate, which had to be abandoned because of purgative results. On the sixth day of its administration after a maximum daily dose of grs. XV q.i.d., the patient developed air hunger and cyanosis, and blood spectroscopic analysis showed evidence of metahemoglobin. These symptoms rapidly disappeared upon the use of oxygen and temporary withdrawal of sulfanilamide followed by reduction in daily dosage. There were no noticeable or subjective symptoms of any beneficial effect. Emergency measures of the routine type were used terminally.

Autopsy.—The autopsy revealed: (1) Generalized miliary tuberculosis, involving the lungs, liver, spleen, kidneys, thymus, lymph nodes, and left seminal vesicle; (2) acute disseminated lupus erythematosus (regressing; (3) emaciation; (4) ingested merthiolate.

Discussion

Early in the course of the disease, attention was focused upon the physical findings in the chest, but there was no progression, and no x-ray changes were noted. The diagnostic study attempted to include elimination of bacteremia of any type, endocarditis, typhoid and related infections and pulmonary tuberculosis. Blood

cultures and common agglutination tests were negative and sputum examination did not reveal the causative organism. Serial x-ray films of the chest were interpreted as negative and a clinical diagnosis of miliary tuberculosis was not established. With the appearance of the skin lesion a diagnosis of acute disseminated lupus erythematosus was established by Dr. H. E. Michelson and Dr. F. M. Lynch, who studied the dermatological aspects of the case. The nature of the skin lesion, the fever, and the rather marked leukopenia were the basis of the diagnosis. Biopsy on June 4, 1937, offered confirmation in the nature of histopathologic changes. The finding of miliary tuberculosis at necropsy brings up the question of frequency of the association of lupus erythematosus and active tuberculosis. Keil² concluded from the study of 125 necropsy records in lupus erythematosus that only 20 per cent showed evidence of active or possibly active tuberculosis. In twenty postmortem examinations studied by Keil, one case of miliary tuberculosis was found in a case of sub-acute lupus erythematosus. Madden³ reported nine cases at the University of Minnesota, and in three necropsies no tuberculosis was found. O'Leary⁴ reported that five of ten cases of acute disseminated lupus erythematosus showed tuberculosis in some form, apparently not active. O'Leary⁴ states the opinion from the evidence thus far that tuberculosis plays no significant rôle in lupus erythematosus, and that the syndrome is one of toxemia probably attributable to an infectious agent. Keil notes that the intensity of the cutaneous process cannot be correlated with the severity of the internal manifestations and looks on the visceral features and cutaneous lesions as due to a common cause. He feels that the patient with acute disseminated lupus erythematosus has a peculiar constitutional background, expressed in terms of an unstable vascular capillary system and that under stimulus of a variety of agents the vessels react to produce the unusual clinical picture. Goeckerman¹ emphasized the protean character of lupus erythematosus and the fact that the systemic manifestations with toxic or abdominal symptoms may predominate. He also noted that the sensitiveness of the patients to irritants in general and to removal of foci of infection was striking.

Summary

In the case of a young adult male, the clinical picture of acute disseminated lupus erythematosus developed with fatal termination, and the autopsy revealed in addition generalized miliary tuberculosis.

The rather unusual association of these diseases is reported.

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◆ HISTORY OF MEDICINE IN MINNESOTA ◆

PIONEER PHYSICIANS OF THE VERMILION AND MISSABE RANGES OF MINNESOTA

By OWEN W. PARKER, M.D.

(Continued from May issue)

Dr. Charles Lenont, whom we have spoken of as having first been associated with Dr. Harwood at the Fayal Mine and Fabiola Hospital, came to Virginia in January, 1901, and for one year maintained a small hospital and office in one of the store buildings on Chestnut Street. The present Lenont Hospital was built in 1903, and has been in continuous operation since that time, but has now been discontinued and remodeled, and houses the Lenont-Peterson Clinic.

The McIntyre General Hospital was built later in Virginia by E. H. McIntyre, who was there for a number of years and finally left, locating in the West.

Virginia has now just finished a fine new municipal hospital which is about ready for operation. Dr. Lenont is Chief of Staff.

Dr. James R. Humphrey, who has been mentioned as being one of the pioneer physicians of Biwabik and Virginia and was later associated with Dr. Shipman at Ely, was a Virginian by birth. He first entered the mining practice at Michigamme, Michigan, having succeeded his old preceptor, Dr. van Deventer, who had then left Michigamme to take a position in Ishpeming.

In January, 1881, he took postgraduate work in New York City, taking private instruction in physical diagnosis under Dr. Ed. J. Janeway, at Bellevue Hospital, and private instruction in operative surgery and surgical dressings under Dr. Joseph G. Bryant. He was in Butte, Montana, for a time and in other parts of Montana, and then came to the Iron Range of Minnesota early, as we have stated, about 1892. He left the Iron Range of Minnesota about 1902 and returned to his old home in Virginia and took over the management of a farm that he had become heir to, an old run-down southern estate of about 500 acres. The stone house on it had been burned during the Civil War. He began to improve the farm and bring it back to its pre-war beauty and fertility. He accomplished this with the same meticulous care and industry with which he did everything that he undertook. He died in his old home state of Virginia, January 10, 1922. He has a nephew practicing at Stillwater, Minnesota, Dr. Wade Humphrey, who at one time was associated with the Shipman Hospital staff at Ely.

Dr. Dana C. Rood was the pioneer physician of Hibbing. He came to Hibbing in 1893 and opened an office as physician for the iron ore mining companies around Hibbing. He was born in Windsor, Wisconsin, a small town near Madison, in 1864. His parents were natives of New York State. Soon after his birth, the family moved back to Watkins Glen, New York, in the beautiful Finger Lake country, where the doctor spent his early childhood and entered school. After finishing the public schools, he entered a preparatory school, or seminary, located at Dundee, New York. His family then moved to Wayne, Michigan. After his preparatory course he entered the University of Michigan, Medical Department, where he was graduated in 1886.

Following his graduation, he came on north and for part of 1886 and 1887 he was associated with Dr. Shipman at Bessemer, Michigan. He then left Dr. Ship-

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man and opened an office in Duluth in 1888 and practiced medicine there. In 1890 he accepted a position in Zacatecas, Mexico, where he was located for about a year. Returning to Duluth from Mexico, he then, through the influence of Frank Hibbing, came to the Range and opened an office in Hibbing in 1892. Some of the doctors associated with Dr. Rood in his early days in Hibbing were Dr. John C. Rosser, Dr. G. N. Butchart, Dr. T. W. Stumm, and Dr. M. M. Ghent. The two latter located in Saint Paul and are now deceased. Dr. George F. Brooks, now located in Stillwater, Minnesota, was also an associate. In 1902, Dr. H. R. Weirick and Dr. S. S. Blacklock joined the staff and a year or so later Dr. W. F. Bullen, Dr. H. K. Reed, and Dr. E. E. Webber of Duluth.

As above stated, when operations began at Hibbing, Dr. Rood left Duluth and became the first physician of Hibbing. The Missabe Railroad reached Hibbing in the fall of 1893. The first train arrived in October or November of that year. After a trip by rail to Virginia, then to Mountain Iron, and from there on horseback, Dr. Rood first came to Hibbing in April, 1893, at which time there were a few tents and log cabins. In August, 1893, he returned to Hibbing to remain, sending in a few surgical and medical supplies, and established an office in the old Hibbing and Trimble building. At this time and for some months following, there was a severe epidemic of typhoid, and two months later Dr. Rood contracted the disease. It was not until the railroad reached there and he had partially recovered that he was able to get away from Hibbing.

About 1912 he left Hibbing and made his residence in Duluth, where he continues to live but still continues his association with the Rood Hospital at Hibbing. Hibbing has become one of the most famous and richest villages in the world. It is called the "Iron Ore Capital." Everything connected with this mining town has always assumed bigness. Along with its interesting history and growth has developed Dr. Rood's staff of physicians, which has become one of the largest medical organizations in the state.

When the north half of the village was moved to new Hibbing, the Rood Hospital was abandoned, and in its place the fine new Rood Hospital building was built at the new town of Hibbing.

The late Drs. Weirick and Bullen were pioneer members of this staff. Dr. S. S. Blacklock, contemporaneous with them, is now superintendent of the Rood Hospital.

Dr. Rood has seen all the amazing development of the great Hibbing district from its very beginning as a small rough mining camp where he went as its first doctor, practicing under difficult circumstances, to its present day greatness, truly a great drama of events to have lived through and have been associated with as first physician. The great village of Hibbing, among all its fortunate circumstances, was indeed fortunate in having a man of Dr. Rood's character and attainments as its pioneer physician.

Dr. Bertram Sage Adams, one of the early physicians on the Range, came to Hibbing in June, 1902, having been assistant to Dr. Bray at Biwabik in 1901.

He put a temporary shack up for an office, and started building a hospital at 426 Mahoning Street, moving into it in September, 1902. This was used for hospital and offices until 1915, when he built the hospital he is now using at 812 Third Avenue.

Dr. Adams has always been identified with all movements to improve medical practice on the Range. He is Councilor of the State Medical Association for this district, the only Range physician ever to hold this position.

Dr. Adams was born in Racine, Wisconsin, and graduated from the University of Minnesota Medical School in 1901. In June, 1902, he opened an office in

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Hibbing, Minnesota, and at the same time opened the first medical office in the new mining town of Nashwauk, with Dr. James George in charge. During the first summer, a tent was used for office and living quarters by Dr. George while a new building was being erected. The following spring, Dr. George moved to Minneapolis, where he practiced until his sudden death about six years ago. His place was taken by Dr. John L. Shellman, who was associated with Dr. Adams for ten years, until he took postgraduate work in eye, ear, nose and throat work and then located in Saint Paul on the staff of Dr. Frank E. Burch, later with Dr. Ellwyn Bray establishing his own office in the Lowry Building in Saint Paul.

In the summer of 1903, Dr. Walter R. Schmidt became associated with Dr. Adams, and two years later opened an office in Chisholm. There he practiced until 1916, when he moved to Glencoe, Minnesota, where he is still practicing.

As previously stated, Dr. C. W. More of Eveleth came to Minnesota in the late eighties, was with Dr. Shipman at Ely for several years, then left and took a postgraduate course in New York, returning, as he says, broke financially. About this time, Mr. George St. Claire was opening a mine in Eveleth and upon the advice of friends, Mr. Joseph Sellwood and Mr. O. D. Kinney, Dr. More accepted a position as physician for the company at Eveleth. Dr. More states in his "Reminiscences of a Range Physician" that he came to Eveleth in June, 1894. The town had been started the year before, but hard times came on and it was partially deserted.

"When I arrived there was a saloon, a boarding house, three or four families, and a few shacks and tents where some of the miners lived. With borrowed money I bought a few drugs and dressings, a second-hand bed spring, a cheap mattress, moved into an unfinished and abandoned saloon shack, and took my meals in a large tent with the other mining employees. This dining tent was located near a small creek one could jump across. A hole had been dug near it by the proprietor of the tent, who was also the cook, to furnish water for washing clothes, dishes, et cetera. The summer was hot and dry. The inside top of the tent was black with flies. Typhoid fever resulted. The sick were cared for in tents, shacks, or wherever they lived. I was doctor and nurse, bathing the men, shaking out the dusty and dirty blankets and sheets if they had any. Most of the patients ran a temperature of 104 and 105. Some had complications. By September, the weather was getting colder. I had been running a low temperature for about three weeks, but kept going until one morning I did not have enough ambition to get up until someone came and wanted to know why I didn't go to see my patients. I was sent to St. Mary's Hospital in Duluth, where Dr. Sam H. Boyer, Sr., took care of me for two months. Drs. Bates and Miller of Virginia took care of the sick typhoid patients after I left. None of the patients in this epidemic of typhoid died. After leaving the hospital, I was laid up with phlebitis for three months. I returned to Eveleth in February, 1895. I went to work again considerably handicapped this time by being obliged to use a cane. I kept as an assistant the young physician who had been looking after my work during my absence, Dr. Darms. We had no hospital, but there was an empty one-story building boarded on the inside of the studding which we had made habitable by boarding up to the ceiling of the first floor on the outside and nailing some building paper on the inside and filling the space with sawdust. I put up two beds and heated the room by the box stove I had bought five or six months before. This makeshift camp served for a hospital for several months, when I had another one built, 25 x 40 feet, one story, but warmer and plastered, and filled with hospital beds. At one time we had nine patients with fractures, including a broken spine and a crushed pelvis."

This story of Dr. More's early experiences as a pioneer physician at Eveleth no doubt is illustrative of what most of the older pioneer physicians of the Range experienced. Dr. More is still on the Range at Eveleth. He probably has been in continuous practice for the mining companies on the Range longer than any other physician. He is Dean of Medicine on the Range. His long years of faithful service and devotion to his patients and to the practice of medicine, his fine char-

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acter and unfailing integrity and absolute honesty entitle him to the greatest respect and honor. That his medical friends and lay friends are not unmindful of this is shown by the fact that they gave him a testimonial dinner in recent years as a token of their appreciation of him as a friend and physician.

Among Dr. More's early assistants were Dr. H. A. Darms, in 1894, previously mentioned, Dr. Wolner, Dr. E. B. Daugherty, now retired and living at Marine-on-St. Croix, and his brother Dr. L. E. Daugherty of Saint Paul, Dr. J. E. Arnold, now of Montana, Dr. F. J. Pratt, now of Minneapolis, Dr. W. A. Day, the late Dr. Fred Barrett, in 1898, and the late Dr. F. W. Bullen of Hibbing, in 1900. Dr. A. W. Shaw of Buhl became Dr. More's assistant in 1899, but left the More Hospital staff and moved to Buhl in September, 1901, and opened a temporary hospital in a store building. He was with Dr. More during the first smallpox epidemic in Eveleth, also during the time the town was moved from the Spruce Mine to its present site.

Buhl was organized in 1899, at the time of the opening of the Sharon Mine. The town was named after Frank Buhl of Sharon, Pennsylvania. Dr. Stuart Bates of Virginia, Minnesota, was the first physician in charge. Later, the Sharon Mine office was converted into a hospital.

Dr. Shaw was the pioneer physician of Buhl. His first assistant was Dr. R. R. Bailey, now of the Bailey Lumber Company. Dr. Shaw built a new hospital in 1918, and this was sold to the County in 1931, and is now used as a County Hospital. Dr. Shaw was at one time assistant in anatomy at the University of Minnesota under Prof. George A. Hendricks. Dr. Hendricks had previously been in the anatomy department at Ann Arbor, associated with the great anatomist, Corydon Ford.

The late Dr. Kirk of Los Angeles was one of the early physicians at Chisholm.

Associated early with the Rood Hospital was Dr. E. H. Nelson, who is still in Chisholm.

There have been many assistants or associates to these pioneer physicians of the Range, some of whom have become very prominent in medicine and surgery. Among them may be mentioned Dr. J. P. Sedgwick, Professor of Pediatrics at the University of Minnesota until his death, who was formerly with Dr. Harwood. Dr. George F. Dick, of Chicago, Department of Medicine, University of Chicago, who has done so much work in scarlet fever, was with Dr. Shaw about the years 1908-1909, leaving Dr. Shaw to study in Vienna. Dr. Frank Hirschboeck, prominent physician of Duluth, also was with Dr. Shaw a number of years. Dr. L. E. Daugherty, one of the prominent surgeons of Saint Paul, and his brother, Dr. E. B. Daugherty, were formerly associated with Dr. More at Eveleth. Dr. Robert Rizer, of Minneapolis, was formerly associated with Dr. Shipman at Ely, leaving Ely to become associated with Dr. Bertram Sippy of Chicago.

The late Dr. T. W. Stumm of Saint Paul was associated with Dr. Rood at the Rood Hospital at Hibbing. Dr. F. W. Schultz, Professor of Pediatrics at the University of Chicago, was on the Range for about one year, 1908-1909, at the Fabiola Hospital, Eveleth, associated with Dr. Harwood.

It may be said of the pioneer and early Range physicians that they were well-trained men and good doctors. Most of the men who came to the Range had had hospital internships and experience in hospital work before the medical schools of the country were requiring internships before graduation. The communities of the Range have been furnished with hospitals very early in their development and growth. Thus they have received a service which was not general over the State of Minnesota, at that time. These hospitals of the Range, that started almost with the beginning of the towns, have rendered a wide variety of service to almost

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every individual in the town, from the very minor things in surgery and medicine to the most complicated medical and surgical service, through their staff of physicians.

The Range Medical Society, organized a few years ago by the Range physicians as a subsidiary of the St. Louis County Medical Society, is a live, active organization, having had many excellent papers presented by men from Duluth, the Twin Cities, and Rochester, and having carried on postgraduate courses nearly every year in connection with the University Extension.

It is a far cry from the Iron Range of the day when Dr. Shipman walked through the muskeg swamp into Ely, when Dr. More settled in a saloon shack in Eveleth, when Dr. Rood first entered and saw the very beginnings of Hibbing, richest village in the world, and Dr. Shaw left Virginia on the "Old Wooden Shoe" at Gary, arriving at Buhl at 2 p. m., getting off at Buhl Station, a box car on a side track, and walking through a swamp on pole stringers, to find the Main Street of Buhl full of stumps. Yes, a far cry to the Range of today, with paved roads, white ways, wonderful school buildings, city halls and community centers, and hospitals, both general and contagious, a marvelous development to have occurred in the lifetime of a pioneer doctor. The frontiers of America have disappeared. The pioneers are fast disappearing, but when the last one has passed over the great divide, may the spirit of the Pioneer still live on, and may America never lose it.

(To be continued in July issue)

Western Electric 3-A Electrical Stethoscope

This portable electrical stethoscope is designed to aid the physician in hearing heart sounds and in diagnosing heart ailments. It has been developed particularly for physicians with impaired hearing, according to the firm. However, it is equally recommended to physicians with normal hearing in examining thick-chested individuals or detecting heart conditions during their early stages. It is claimed by the firm that other useful applications will be found in obstetric and lung fields. The Electrical Stethoscope essentially consists of a sensitive microphone, a vacuum tube amplifier and a receiver to reproduce the sounds. The two-stage amplifier, operated by dry batteries, will increase the loudness of the heart sounds about 20 decibels, or 100 times the intensity obtained with an ordinary acoustical stethoscope. The amplifier contains a filter which may be cut in or out of the circuit by means of a switch. The filter control diminishes the response at both the low and high frequencies; thus the intensity of normal heart sounds is lowered and the loudness of any existing murmurs is accentuated by the isolation. The Council reported that the instrument distorts in a measure the heart and breath sounds so that a certain amount of experience is necessary to learn the normal sounds as produced by it. Western Electric Company, New York. (J.A.M.A., April 2, 1938, p. 1111.)

EDITORIAL

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BUSINESS MANAGER

J. R. BRUCE

Volume 21

JUNE, 1938

Number 6

State Meeting

THE stage is set for our annual meeting which
is to be held this month in Duluth, almost two
months later in the year than last year's meeting
in Saint Paul. The time of meeting has been so
planned that those attending can spend the week-
end over the fourth of July in recreation in the
north woods.

Perusal of the program, which appears in this
number of the journal, shows that the main
meetings of the Council and House of Delegates
will be held in advance of the scientific sessions
so as not to interfere with attendance at the gen-
eral assemblies, which will this year replace sec-
tional meetings. With clinics the third day, the
program will occupy three instead of two days.

JUNE, 1938

Nine outstanding specialists will appear as
guest speakers on the program. Dr. Irvin Abell
of Louisville, president of our national associa-
tion and an outstanding surgeon, will address the
Public Health meeting, open to the public, on the
aims of the profession as they relate to the pub-
lic. He will also give a talk to the profession on
cancer. We all know of Dr. Howard W. Hag-
gard of Yale, author of "Devils, Drugs and Doc-
tors," who is equally famed as a public lecturer.
He will address the Public Health meetings and
will speak at the banquet Thursday evening.

Members of the Women's Auxiliary of the
State Medical Association and the wives of
state members who are not Auxiliary members
are urged to attend the convention. In addition
to the regular annual Auxiliary meetings, the
St. Louis County Auxiliary members have ar-
ranged entertainment for visiting ladies, out-
standing being a boat trip on Lake Superior on
the Canadian liner Hamonic, on Friday.

The golf tournament for Association members
is scheduled for Saturday following the meeting.
For those who have never played the Northland
course, there is the experience in store of watch-
ing a golf ball defy the laws of gravity by rolling
up hill on the greens.

Some twelve hundred physicians are expected
to attend the meeting. While most of those at-
tending will be from Minnesota, an increasing
number from neighboring states have been taking
advantage of the scientific program in recent
years and are again being invited to attend.

The Army Medical Library and Museum

THE present building of the Army Medical
Library and Museum at Seventh Street and
Independence Avenue in Washington was con-
structed by Congressional appropriation in 1887
and is now entirely obsolete and inadequate.
Now pending in Congress is a bill providing for
the appropriation of \$3,750,000.00 to replace, in
a better location, the present building with a
modern fireproof structure of a type and style
commensurate with the importance of this unique
collection of books and specimens.

The Army Medical Library, now the largest

medical library in the world, was established in a small way by Surgeon General Lovell in 1836 and was known for many years afterwards as the Surgeon General's Library. It now contains approximately 500,000 books on medical subjects and, with the pamphlets, theses and other manuscripts, its collection numbers over a million separate items. By Acts of Congress of 1892 and 1901 the Library and Museum have been available to all scientific bodies and students. Thousands of readers and writers visit the Library yearly and by its inter-library loan system any reputable physician or scientist in this country may obtain any but the rarest books in its collection by making his request through the nearest library. It is the great central repository of medical literature, old and new, and contains many rare books, among them being about 460 of the existing 600 medical incunabula, or books published in the cradle age of printing, before 1500.

The oldest publication possessed by the library is Johannes Gerson's "De pollutione nocturna," printed in Cologne, in 1467, the only copy in the United States. Other rare old books are "Speculum humanæ vitæ" by Rodericus Zamorensis, printed in Rome in 1468, while among early writings on plague are "De epidemia" by Valescus de Taranta, Basel, 1470 and "Regimen pestilentia" by Alcanis Luis, printed in Valencia about 1490. The library has also a perfect copy of the first printed book on pediatrics, Bagellardo's "De infantium ægreditudinibus," Padua, 1472, one of the two copies in the United States. Many of the incunabula are first editions. "De medicinis universalibus" by the Arabian physician Mesue the younger, printed in Venice in 1471, is the first purely medical book ever printed in the world.

The Library now receives two thousand medical journals and indexes every important article from every journal regardless of its country of origin or its language. The Index Catalogue of the Army Medical Library is world famous and has been in existence since 1879. It was characterized by the late Professor Welch of Johns Hopkins University, with the library itself, as "America's greatest gift to medicine."

The Army Medical Museum, now containing the largest number of pathologic preparations in America, was started in 1863 with specimens

from the hospitals and battlefields of the Civil War, and its enormous collection now covers the entire field of pathology. It maintains registries in seven important fields: eye, ear, nose and throat pathology, bladder tumors, lymphatic tumors, tumors in general, skin pathology and dental and oral pathology, all sponsored by national organizations interested in these various subjects, collecting and assembling the specimens with all available data in systematic fashion for ready consultation. With the Library, the Museum and the Index Catalogue, every resource for writing or research in any subject of any field of medicine is available under one roof. To the genius and industry of John Shaw Billings, whose career was epitomized in the editorial columns of MINNESOTA MEDICINE last month, is due the development of these three great activities, and the entire medical profession has been the gainer therefrom. It is little enough, it seems to us, that we lend our support to this movement to secure adequate housing for these priceless collections of books and specimens, where they may continue to give aid and support to the cause of scientific medicine.

G. C.

Insulin a Life Saver

SEVERAL years ago (1931) we called attention to the rise in the death rate from diabetes mellitus which had been unaffected by the discovery of insulin.* The death rate from diabetes had increased from 15.9 per 100,000 population in 1912 to 23.3 in 1928. In 1936 it had not receded and was 23.7. The explanation for such an unexpected increase was that either diabetes is more often diagnosed or is on the increase, or both.

How much of a boon insulin has been to diabetic individuals is well presented in a statistical analysis† of 2,271 deaths in diabetic patients seen by Joslin at the Baker Clinic in Boston between 1897 and 1928. The analysis of such statistics belongs to the sphere of the expert statistician and we are content to abide by the conclusions drawn by Dublin.

The patients are grouped according to the

*The Strange Case of Diabetes. Editorial. Minn. Med., 14:560, 1931.

†Joslin, E. P., Dublin, L. I., and Marks, H. H.: Studies in Diabetes Mellitus. VI, Mortality and Longevity of Diabetics. Am. Jour. Med. Sci., 195:596, 1938.

Naunyn period (1897-1913); the Allen period (1914 to 1922); the first Banting period (1922-1925), during which the medical profession was learning how to use insulin; and the second Banting period (1926-1928), when the best results of insulin therapy could be evaluated. The conclusions present in concrete form the progress made in the prolongation of life by the development of new and better methods of treatment.

Roughly speaking, the death rate in these diabetic patients fell a third in the Allen period compared with the Naunyn period, and in the second Banting period was 74 per cent lower than in the Naunyn period. The most marked improvement was in children, and comparing the Naunyn and second Banting period, the mortality for the first two decades of life was reduced 98 per cent, for the third decade 95 per cent, and for the fourth and fifth decades 80 per cent.

In the group of diabetic patients investigated the life expectancy for children under ten years of age jumped from a little over one year to thirty-three, and at the age of twenty increased from two and a half years to twenty-eight. The increases in later periods of life, while less startling, were, however, substantial, for at the age of forty the gain was eleven years and at sixty about four and a half years.

While the mortality in diabetic individuals in the group analyzed is still higher than that in the general population, it being six times as great in the younger groups and twice that in the older groups, the improvement that modern treatment, and especially the use of insulin has afforded, is nicely shown in this analysis.

Gonococcus Filtrate (Corbus-Ferry) Not Acceptable for N.N.R.

Since 1931, the Council on Pharmacy and Chemistry has considered from time to time this product, which is a gonococcus bouillon filtrate proposed for the treatment of gonorrhea and marketed by Parke, Davis & Co. Two preliminary reports have been published (*The Journal*, Feb. 13, 1932, and May 18, 1935), and each time the Council has postponed consideration to await the development of more convincing evidence of the therapeutic value of the product. In the meantime the firm has made efforts to collect the needed clinical data and has abstained from promoting the product actively. The occasion of the Council's latest consideration of the product was the presentation by the firm of a booklet with references to recent literature concerning Gonococcus Filtrate (Corbus-Ferry). The Council considered the literature cited by the firm, together with other reports which were available, and concluded that satisfactory evidence for the use of this product is lacking. Gonococcus Filtrate (Corbus-Ferry) (Parke, Davis & Co.) was therefore declared not acceptable for N.N.R.—(J.A.M.A., Jan. 1, 1938, p. 47.)

JUNE, 1938

In Memoriam

F. Emerson Daigneau

1862-1937

DR. F. EMERSON DAIGNEAU was born at Hubbardton, Rutland, Vt., October 1, 1862, and got his early education in the schools of that village. After attending Newton Academy at Shoreham, Vermont, he followed this with a course in the college at St. Hyacinthe, in the Province of Quebec. Later he went to New York and by his own resources worked his way through college there. He returned to Vermont and entered the medical department of the University of Vermont, graduating from there at the head of his class in 1886, with the degree of Doctor of Medicine. He received the highest honors of his class and the first prize established by the faculty for "general proficiency in examinations."

Dr. Daigneau practiced for a time at Somersworth, N. H., a year later came west to Saint Paul, and shortly thereafter came to the then growing city of Austin, where he remained until his death December 10, 1937. He was at one time a member of the Mower County Medical Society and the St. Olaf Hospital staff.

Dr. Daigneau was married March 31, 1888, to Miss Alice Merrick, of Somersworth, N. H., who survives him. He is also survived by six children: Donald V. and Ralph H. of Austin, Kenneth S. of New York, Maurice of Cleveland, Marcia L., now Mrs. P. H. Macfarlane of Chisholm, and Elizabeth A., now Mrs. T. E. Linnihan of Everly, Iowa.

Charles M. Storch

1870-1938

DR. CHARLES M. STORCH was born in Milan, Ohio, in 1870, and died March 13, 1938, at his home in Biloxi, Mississippi, after an illness of three years' duration.

Dr. Storch received his medical degree from the University of Michigan in 1891, after which he studied a year at the New York Polyclinic. He then became associated with his uncle, Dr. Charles Stewart, in Duluth. Moving to Grand Rapids, Minnesota, he devoted himself there to general practice for thirty-three years, until 1935, when he went to Minneapolis. Ill health prevented his carrying on active practice in Minneapolis.

Dr. Storch's father, Dr. August von Storch, was a graduate of Heidelberg University and for many years was a well known medical authority in Washington, D. C. He is survived by his widow, a half brother, Dr. Raymond Storch, a lieutenant commander in the United States Navy, and a step-son, Ralph E. Dawley, of Long Beach, California.

Dr. and Mrs. Storch moved to Biloxi about a year and a half ago, to occupy a home they had built there.

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the

Minnesota State Medical Association

W. F. Braasch, M. D., Chairman

SURVEY PROGRESS

Form No. 1 of the Survey on Medical Care was sent in May to all secretaries of county and district medical societies in Minnesota for distribution to members.

These forms should be filled in carefully and returned **UNSIGNED** to the county or district secretary.

The objective of this Survey is, fundamentally, to find out how many there are who are going without needed medical care and why.

This objective cannot be accomplished without the active interest and assistance of every physician.

HAVE YOU FILLED OUT AND RETURNED YOUR FORM?

If not, you should do so immediately. This is the most important task before American Medicine today.

The bulletin and instruction sheet which accompanied the Form is printed below in the hope that it will serve to re-emphasize in the minds of all physicians the importance of their part in this nation-wide effort.

Your Professional Future Is at Stake

Our whole system of medical practice in the United States has been challenged. There is criticism of the medical profession and of the adequacy of medical care on all sides.

ARE WE FAILING TO DELIVER ADEQUATE MEDICAL CARE TO ALL THE PEOPLE?

If we are, we must know the facts. Other groups who have attempted to study medical care have not presented a true picture of conditions because they have not had the active participation of the physician, who is the chief factor in the delivery of medical care in the United States.

NOW—THE AMERICAN MEDICAL ASSOCIATION, WITH THE ASSISTANCE OF HOSPITALS, NURSES, DENTISTS, PHARMACISTS, IS UNDERTAKING AN ACCURATE, HONEST, COUNTY-BY-COUNTY STUDY OF THE FACTS.

THIS IS YOUR STUDY—AND THE RESPONSIBILITY FOR MAKING NEEDED IMPROVEMENTS AS DISCLOSED IN THIS STUDY WILL BE YOUR RESPONSIBILITY. ABOVE ALL IT IS NOT TO BE JUST ANOTHER STATISTICAL EXERCISE TO BE FILED AWAY AND FORGOTTEN.

Following are the instructions for fill-out Form No. 1. They are numbered according to the question in each case. Forms are to be returned to me* *unsigned*.

1. If you have no exact figures, make a careful estimate.
2. Relief, Old Age Assistance, Farm Security patients, etc., included.
3. Make as accurate an estimate as possible.
4. Exact figures should be available here in most cases.
5. This refers to private practice as well as to public health services.
6. Make this reply as exact as possible.
7. This question should be answered frankly and fully.
8. Exact figures if available; otherwise give a careful estimate.
9. This is important. Answer in detail using extra sheet if needed.

*Secretary of Society.

Teachers Respond

Officers in charge of the Survey in Minnesota have been especially interested to note the enthusiasm and promptness with which other agencies have responded to the request for assistance in gathering pertinent information from their own records and experience.

Hospital, nursing and welfare organizations have taken an official hand in sending the appropriate forms to their member groups. The State Department of Education has sent forms to all superintendents of public schools in the state. Information is coming in rapidly from parochial and Catholic high schools all over the state and from the colleges, all of whom are communicating directly with the State Office.

Interest Is Keen

The speed and alertness exhibited by the principals of the Catholic secondary schools in responding to the request is an encouraging indication of the interest of these educators in the

health of their charges and in the effort of the physicians to make accurate studies of their needs.

Below are comments selected at random from the large number of questionnaires already returned in spite of the fact that they reached the desks of the Sister Principals in the busiest month of the year.

It should be noted that a significant number attribute lack of proper care among their pupils to parental neglect.

It is obvious, also, in these comments that, while county medical societies are shouldering their responsibilities in many communities, in others not even a nurse has interested herself in the health of the school for years. It is the hope of the committee in charge of the Survey that this study will bring home to doctors everywhere the need to correct such situations as this wherever they are found. If the interest is great enough, some arrangement can always be made, and the best arrangements, as these answers indicate, are in the communities where the local doctors have taken a hand.

* * *

"We believe an annual dental examination would prove a great benefit. As there are several pupils in each classroom of our school who need glasses, a check-up on sight would be a great help."—Madison.

Parents Careless

"Arrangements for health supervision are made chiefly by the teachers and by the parents in our school. Nothing special is done in this line. The county nurse should do it but has not come around within five years or more. The fact is that even if the parents are told to take their child to a physician, it is not done. Many of our children lack needed medical care but it is due chiefly to carelessness on the part of the parents."—Collegeville.

* * *

"Every fall the physicians and a dentist from town come to examine our pupils but do not give free treatments. Last fall all our children were immunized against diphtheria and vaccinated for smallpox. The charge was 50 cents for each child. Our children are fairly well taken care of by their parents. We know of but one family that is in great need of medical care but has not the means to meet expenses. There ought to be a general fund to provide for this deficiency."—Loretto.

Legion, Lions Assist

"The local American Legion has sponsored a health program in the local schools the last two years. Previous to that we had a county nurse for a brief period of time. She visited the schools once during a term. Due to our doctors from both clinics who offered their services gratis and also to the coöperation of the able chairman of the American Legion Auxiliary, all the children whose parents consented were both vaccinated and immunized against diphtheria.

"Our pupils who suffered from poor eyesight and were too poor to pay for medical care of glasses were cared for by the local Lions' Club.

"The superintendents of the various schools here have agreed on engaging a nurse for the coming school term. Each school has been taxed for the purpose and our Reverend Pastor and his trustees will pay their apportionment."—Wadena.

"They Would Be Well Served"

"Arrangements with the county medical society were made for free vaccinations of whole families of indigent children. The people in this community would be well served if they took advantage of all services offered either free or at a small cost . . ."—Minneapolis.

* * *

"We as teachers feel that something should be done. We positively know that some pupils need medical attention for teeth, eyes, undernourishment, etc. Some children, for example, can read only when their eyes are at a certain angle. We have asked the parents to look after these children but we must have influential coöperation."—New Market.

* * *

"The need for medical care among the children of this particular school seems not great as the parents take exceptionally good care of them and willingly coöperate in any measures which are proposed to safeguard their health. From the standpoint of the teacher, however, it would be immeasurably valuable to us if through complete physical examinations we could become acquainted with the physical status of our children. Experience has taught us that often retardation is due to some unknown physical defect. If the health department is not able to appoint doctors to conduct these examinations periodically perhaps volunteers from the medical profession would give a day or a half-day to this work."—Minneapolis.

Need Nurse

"Common colds and coughs are greatly neglected. Skin diseases have gained some headway this year. A number of our pupils' eyes have been examined by oculists at our suggestion. We should deem it advisable to have the services of a nurse at least once a year."—Kimball.

* * *

"Some arrangements should be made for dental treatment or clinics for parochial schools. Ancker Hospital and Wilder Dispensary are overcrowded and do mostly extractions. Indigent pupils and those that could pay a little must neglect their teeth until decay progresses far enough for extraction."—Saint Paul.

* * *

"The county nurse visited our school once in four years. We have no doctor in this town."—Greenwald.

* * *

"No physician or nurse has called here since 1936. We have had good attendance at school this past school year and very little sickness. If any child living near by is sick we send him home immediately; if he lives at a great distance and has no telephone at home we give as much relief as we can by applying home remedies."—St. Leo.

* * *

"Three or four promises have been made to inspect our children; however, none was kept. We have received no attention this year."—Virginia.

Thanks to Doctors

"The medical care of the boys in this school is excellent—thanks to the splendid men of the Minnesota Medical Association who give generously of their time and service."—Minneapolis.

* * *

"Both medical and dental societies are willing to give treatment free of charge to pupils who are in need of such service."—Faribault.

BUTTER SUBSTITUTE CONTROVERSY

Did the A.M.A. discriminate against butter in favor of oleomargarine?

It did not.

Why did the A.M.A. refuse to standardize butter?

Because they found it impractical with their limited resources to inspect and standardize the innumerable brands and the constantly changing character of butter.

Their action was taken with no intent whatever to discriminate against butter in favor of any other product.

They took it for granted that everyone knew that natural butter fat was preferable to any substitute.

They also knew that Federal inspection was available to any producer of butter who wishes inspection and certification.

Why then did the A.M.A. continue to standardize and grade substitutes for butter fat?

Because there are many brands on the market which are being consumed by the public, some of which are of much higher nutritional value than others.

The public had no means of determining their comparative value.

The A.M.A. approved those brands which on analysis had the greatest food value. In this way the interests of the public were protected—not the manufacturers.

Such action in no way discriminated against butter or the farmer.

Iowa Protest

The Iowa State Medical Association passed a resolution on May 13 protesting the acceptance of substitutes for dairy products. The action was taken, without doubt, because of local agitation among Iowa dairy farmers and manufacturers of dairy products.

There has been similar agitation in Minnesota; but most physicians and others in Minnesota realize well the position of the American Medical Association. They know that everybody, including the "oleo" manufacturers, are aware of the superiority of butter as a food to any of its substitutes. They also know that there are millions of people in some sections of the United States who cannot afford to buy a sufficiency of dairy products for their families. People demand and use a cheap substitute and they are entitled to know, if possible, whether wholesome materials are used in the substitute and whether or not it is produced under wholesome conditions.

Public Duty

In investigating these substitutes as they apply and awarding the Seal of Acceptance to those whose materials, manufacture and advertising claims live up to the high standard

of the Council, the American Medical Association is performing an essential public duty.

The fact that the Council on Foods was not influenced by the indignation of an important legitimate industry which it must have known would rise against it, is another sign of integrity. This integrity must be maintained, no matter what opposition may be stirred up, if the Council on Foods or any of the Councils of the American Medical Association are to perform a useful function.

MINNESOTA ATTORNEY GENERAL RULES IN FAVOR OF FREE CHOICE OF PHYSICIAN

The Honorable William S. Ervin, Attorney General of the State of Minnesota, has recently issued a ruling that is not only of great interest, but of real importance, to the medical profession of Minnesota. The ruling concerns the right of a person on relief to select his own physician. Following an exhaustive study of the matter, Mr. Ervin has ruled that a person on relief may select his own physician, and cannot be required "to go to the county physician if such person desires to use the services of another physician who conforms to the regulations of the Executive Council and of the responsible relief agency."

Section 11 of Chapter 89 of the Extra Session Laws of 1937 provides in part:

"All counties shall permit free choice of vendor to relief clients for relief orders, provided that the vendors thus chosen conform to the regulations of the Executive Council and of the responsible relief agency."

The question presented is whether or not "free choice of vendor" includes the services of a physician. Mr. Ervin points out, in his opinion, that the purpose of construing the law "is to ascertain and give effect to the intention of the legislature." He then goes on to point out that, following the enactment of this law, the State Relief Department on September 22, 1937, issued an administrative letter to all county welfare boards in which it was stated that persons on relief should be permitted to select their own doctor. That letter contained the following statement:

"Client will request Medical Relief Order from county worker. If qualified, he will be given order on SRA Form No. 94 addressed to physician, hos-

MINNESOTA MEDICINE

pital, or other vendor who is selected by client. This form will be presented to vendor, physician, dentist, hospital, or other, and will be authority for rendering the specified service. Responsibility for medical care is not accepted without his order except in emergencies."

Mr. Ervin richly deserves the thanks not only of those persons who are so unfortunate as to be out of work and on relief, but also the appreciation of each and every member of the medical profession, for his broad and fair-minded interpretation of this law. It seems only right and proper that when free choice is permitted as to the every-day commodities of life, such as food, clothing, etc., the principle of free choice of physician should be preserved.

MEDICAL CARE IN THE DOMINION

New plans for delivery of medical service are being worked out on an extensive scale these days by Canadian medical associations and the provinces and municipalities.

This development should be of great interest to physicians of the United States because conditions and people in various sections of Canada more nearly resemble those below the border than in any other country in the world.

Looking to England

It is quite natural, of course, that there should be a sympathetic feeling toward health insurance among a good many Canadian physicians since Canadians normally look to England to lead the way in many fields. It is interesting to note, however, that, where the mother country rushed headlong into health insurance and spent twenty-five years patching up discrepancies and undoing blunders, Canada is proceeding cautiously, gathering statistics, making local studies. If health insurance should ever become a reality there, on a national scale, it will be with full knowledge that the needs in the Western Provinces are quite different from those in the urban centers and that many little plans must be made to fit into the general pattern.

This was the gist of an address by Dr. F. W. Jackson, Deputy Minister of Health of the Province of Manitoba, before the Conference of State and Provincial Health Authorities of North America in Washington recently. Following are some of the types of service now

in operation in various parts of the Dominion as described by Dr. Jackson:

The Municipal Doctor System. By this system the municipality, local unit of government in Western Canada, covering an area of from 200 to 300 miles with a population of from 1,500 to 3,000 persons, hires the doctor on a salary basis. The salary varies from \$3,000 to \$4,000 yearly with certain perquisites and allowances for leaves to take post-graduate work, attend meetings. The municipal doctor is health officer and physician and he has the right to charge for a certain portion of his services.

System Is Spreading

This type of service has extended of late until it covers more than one-fifth of the rural municipalities of Saskatchewan already, with as many more preparing to institute similar plans. In Manitoba nine rural municipalities are receiving medical care under the plan with three or four others preparing to join them and two providing similar care for their urban residents on a *fee for services rendered basis*.

Lump sum basis with free choice of physician. In the Province of Ontario the Provincial government pays over to the medical profession a definite amount, varying from 35 to 50 cents per head, for medical care of the unemployed. The profession in return sees that care is provided. The doctors have divided the province into 11 districts with a local committee of physicians to supervise the service and distribution of funds for the district. The physicians send an account of services rendered at the end of each month, using the regular schedule of fees, and the physicians' committee prorates the total amount available. It appears to work out at about 40 per cent of regular fees paid to the physicians who do the work.

In the western provinces the same type of plan is operating in the cities.

Like Minnesota Plan

Fee basis with free choice of physicians. In Winnipeg a system of services upon a special fee basis has been set up with much the same type of regulation as governs medical care for the indigent in the majority of Minnesota counties. The city provides the funds but the administration is under complete control of the medical profession through a medical advisory committee which has

authority to settle all disputes that may arise. The same plan is followed in most of the other cities in the Province of Manitoba.

It should be interesting to Minnesota physicians to note that in Manitoba wherever the service is in charge of the Manitoba Medical Association, a deduction of 5 per cent is made on all doctors' accounts. This 5 per cent is paid into the funds of the Association for defraying costs of supervision. It has resulted in the accumulation of a considerable sum of money above and beyond the amount needed to administer the service and this fund is to be held, according to Dr. Jackson, "in a trust fund to be used if and when consideration is given to some province-wide form of state medicine or health insurance."

Statistics for the Future

"The information obtained from the returns of the physicians under the plan in operation in Winnipeg," Dr. Jackson also remarked, "has been tabulated from year to year and we are now getting a fund of statistics which will be of real value in estimating the amount and type of illness and its requirement in terms of medical care in an urban community."

Health insurance acts have been passed in Alberta and in British Columbia. In Alberta, although the act was passed in 1934 setting forth all details, the plan has as yet not been put into operation. In British Columbia, as noted previously in these columns, the opposition of the organized medical profession has made it impossible to establish the plan. The opposition, according to Dr. Jackson, was due chiefly to the decision of the government not to include indigents in the scheme. A plebiscite on the question which took place in the summer of 1937 is said to have revealed public opinion in favor of some sort of Health Insurance.

"What the future may hold," said Dr. Jackson in conclusion, "remains to be seen; but one fact is apparent—as yet we have not the required information in Canada to allow us to set up in all its details, with any degree of actuarial accuracy, a scheme of adequate medical care for all groups of our population. We must get more information as to the amount and types of illnesses among the various groups of our population in the different sections of Canada and it would seem unwise for the Dominion or any province to embark on a wholesale scheme for the provi-

sion of medical care until such time as this information is available."

U. S. Needs Facts

In the United States there is no interest in wholesale changes in medical practice on the part of any but isolated groups. The reason is doubtless because medical care has been much better distributed and is much more easily available in most parts of the country than in the Dominion.

The same need for exact information exists here as in Canada, however, though for a somewhat different reason. Medicine in the United States has been definitely challenged. If the system in general is adequate, we must have facts to prove it. If it is not adequate, we must be ready, on the basis of accurate information, to make whatever changes are needed in the places where they are needed.

This is a doctor's job.

EFFECTIVE ORGANIZATION—DOES IT PAY?

(Monthly Editorial Prepared by the Medical Advisory Committee)

Says William L. Ransom, Past President, American Bar Association, in a recent address at the annual meeting of the Federation of the Bar Association of Western New York, speaking of the greater cohesion and efficiency of the medical profession as compared to that of his own association:

"One of the striking variances, which is probably responsible for a great deal of the greater unity and effectiveness of the medical organization, is the fact that the latter has been able to prove itself useful to its members, in practical ways. A physician needs and wants to belong to the organization of his profession, if he can possibly get in. Membership is looked on as a certificate of professional standing, and the Association has developed a capacity for supplying the average medical doctor with factual data and experience which are highly useful to him in his professional work. The medical organizations have made themselves virtually indispensable to the average practitioner in the field of medicine.

"Neither the American Bar Association nor the State Bar Association have as yet developed any such propensity or capacity."

So speaks a man looking in. Your Medical Advisory Committee believes that no greater compliment could be paid to us and our organization than this by one who has held high office in the Bar Association. Are you as a member of the Minnesota State Medical Society doing your share to promote effective organization and personal harmony among your colleagues? Does it pay to promote greater unity of purpose among our membership?

ECONOMICS SESSION

Chief Justice H. M. Gallagher will be principal guest speaker at the annual Medical Economics session to be held in connection with the State Meeting at Duluth, June 29, 30 and July 1.

Medical jurisprudence and our relations with the Bar have a place of particular prominence at this session. The second speaker is Mr. Stanley B. Houck of Minneapolis, Chairman, Standing Committee on Unauthorized Practice of the Law, American Bar Association.

Following these two talks scheduled for Friday morning, July 1, Dr. J. M. Hayes of Minneapolis will give the annual president's address. The subject, "Medical Problems in Minnesota," is timely and the active participation of President Hayes in medical, medical-economic and sociological affairs of the society assures a vigorous and individual paper.

"THE COMMUNITY PAYS"—Parran

"The community pays for preventable disease and disability. It pays in relief of the unemployed, in pensions and in institutional care. It would be cheaper for us as a nation to spend more for the prevention and care of disease than to continue to bear its money cost. It is, therefore, not only the humane but the practical consideration which brings to our attention the acute need for dealing courageously with unnecessary sickness in this country. Our efforts up to now have been sporadic, half-hearted, and frequently unscientific. The time seems opportune for the best minds in the medical profession to consider how medical knowledge can best be brought to fuller use by all of the people—how we may take up the lag between what we know and what we do. It should be possible for a national health program to be evolved which would be adapted to the varying needs of each state and community.

A practical program to utilize our scientific resources for life-saving would bring advantages to our profession almost as great as to the population which would be served."—SURGEON-GENERAL THOMAS PARRAN, U. S. Public Health Service, before the Conference of State and Provincial Health Authorities of North America, April 9, 1938.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

Cokato Chiropractor Pleads Guilty to Practicing Without a License

Re State of Minnesota vs. Harold A. Kirsch.

On May 2, 1938, the above defendant, Harold A. Kirsch, thirty-three years of age, entered a plea of guilty to an information charging him with practicing healing without a basic science certificate. Kirsch pleaded guilty at Buffalo, Minnesota, before the Honorable Leonard Keyes, Judge of the District Court for Wright County. After hearing the facts, Judge Keyes sentenced the defendant to pay a fine of \$200.00 or serve sixty days in the Minneapolis Work House. The defendant is suffering from multiple sclerosis, and the Court, upon being advised of all the facts, suspended the sentence and placed the defendant on probation upon the condition that he refrain from practicing healing in any manner.

Kirsch, who stated that he was raised at St. Cloud, opened an office at Cokato, Minnesota, in the fall of 1937. He represented himself to the public as a chiropractor and an x-ray technician. He claims to be licensed to practice chiropractic in the State of Iowa, and that he formerly maintained an office at Mason City, Iowa. Following an investigation conducted by the Minnesota State Board of Medical Examiners, a complaint was filed against the defendant on February 1, 1938. Following his arrest Kirsch closed his office. The office has since been reopened by a licensed chiropractor. The defendant undoubtedly deserves considerable sympathy because of his physical condition; nevertheless, he was previously advised that he could not practice in Minnesota without a license, and consequently, when he opened up his office, the Board had no other alternative than to proceed with the case.

Austin Doctor Dies Following Arrest

Re State of Minnesota vs. Fannie Fiester.

On Wednesday, May 4, 1938, the Minnesota State Board of Medical Examiners received a telephone call from Mr. A. B. Anderson, County Attorney of Steele County, informing them that Mr. and Mrs. Anton Ruzek, R. F. D. No. 2, Blooming Prairie, were in his office to make a complaint that a lady doctor at Austin had performed a criminal abortion upon their eighteen year old daughter. The co-operation of the Medical Board was requested in making the investigation and Mr. Brist was assigned to this case.

Following the investigation, which was immediately made, and which included a long signed statement by the daughter, a complaint was filed on May 5, 1938, by the mother, and a warrant issued for the arrest of Dr. Fannie Fiester of Austin. Dr. Fiester was questioned by Mr. Edward T. Helgeson, Sheriff of Steele County, and Mr. Brist, and also by Mr. A. C. Richardson, County Attorney of Mower County. Dr. Fiester admitted having performed the criminal abortion and also admitted performing a number of other unlawful abortions. Dr. Fiester was very frank in her statements, and upon being arraigned in the Municipal Court at Austin, she was released on condition that she furnish a \$500.00 bond. The matter was continued until Friday morning, May 6, at which time it was learned that Dr. Fiester was found in a serious condition and died that evening about 10 P.M. Mrs. Ruzek also filed a complaint against Mrs. Clara Cole of Blooming Prairie in connection with this case, and also a complaint against Lyle Cole, twenty-four-year-old son of Mrs. Cole. The complaint against Lyle Cole was filed in Steele County.

This statement is made by the Medical Board in fairness to everyone concerned, and particularly in view of the fact that the case ended in the manner that it did. The Board feels that Mr. Anderson and Mr. Stone, the Assistant County Attorney at Owatonna, Sheriff Helge-

son, Mr. Richardson and Deputy Sheriff Enochson of Austin, were sincerely attempting to perform their duty in respect to this case, and that, while it had a tragic outcome, the entire matter should serve a worthwhile purpose.

Minnesota Physician's License Suspended for Two Years

In the Matter of the Revocation of the License of Harold Rees, M.D.

On May 13, 1938, the Minnesota State Board of Medical Examiners suspended for a period of two years the license to practice medicine held by Dr. Harold Rees of Minneapolis. Dr. Rees' license was suspended because of habitual indulgence in the use of narcotics. His case was called to the attention of the Board by a shortage in his supply of morphine and cocaine discovered by agents of the Bureau of Narcotics.

Dr. Rees is at the State Hospital at Willmar at the present time following his commitment from Hennepin County on April 13, 1938. Dr. Rees has been at Willmar on several previous occasions and the leniency shown him on those occasions accomplished nothing. If Dr. Rees leaves the hospital this time before he is discharged by competent authority his license will be revoked permanently.

Dr. Rees was born in Norway in 1869 and is a graduate of Rush Medical College in 1896. He was licensed in Minnesota by examination in 1900. Dr. Rees has practiced in the following towns in the past ten years: Saint Paul, Cambridge, New London, Ogilvie, Rose Creek, Rushmore and Minneapolis.

Medical Board Revokes Minnesota License of Indiana Physician

In the Matter of the Revocation of the License of George Henry Espenlaub, M.D.

At the regular meeting of the Minnesota State Board of Medical Examiners held on May 13, 1938, the Minnesota license to practice medicine held by Dr. George Henry Espenlaub now serving a one to ten year sentence in the Indiana State Prison at Michigan City, Indiana, was revoked. Dr. Espenlaub, while practicing at Evansville, Indiana, was convicted of a felony, to-wit: assault and battery with intent to commit a felony, to-wit: Rape. Dr. Espenlaub was convicted by a jury and his conviction was upheld by the Supreme Court of Indiana. The record discloses that the crime was committed upon a patient in the office of Dr. Espenlaub.

Dr. Espenlaub was born in Evansville, Indiana, in 1898 and received his M.D. degree from Indiana University in 1922. He was licensed in Minnesota in 1923 by reciprocity with the State of Indiana. However, Dr. Espenlaub did not register with the Minnesota Board in 1928 under the Basic Science law nor has he registered since that date.

POTENCY OF LIVER PRODUCTS

As there is no satisfactory laboratory method which may be used for the standardization of anti-anemia preparations, the Committee of Revision of the Pharmacopeia has provided for an Anti-Anemia Preparations Advisory Board to pass on clinical data which manufacturers of these products might present, and if the data indicated a satisfactory degree of potency, the board would approve the product and it could be labeled under the U.S.P. title. Under the rules of the board the amount of liver supposed to be represented in the product may not be mentioned on the label, as it is likely to be misleading; a product derived from 100 Gm. of liver is not necessarily twice as potent as one made from 50 Gm. Products will now be labeled in units, and patients should receive for a maintenance dosage an average of about a unit each day. (J.A.M.A., March 19, 1938, p. 903.)

OF GENERAL INTEREST

Dr. G. C. Edwards, formerly of Grove City, has opened an office in Cokato.

* * *

Dr. W. R. Kostick, formerly of Robbinsdale, has located in Fertile, where he will practice medicine.

* * *

Dr. and Mrs. E. O. Strassman have moved to Houston, Texas, where Dr. Strassman will practice medicine.

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Dr. John S. Hamlon of Minneapolis has become associated with Dr. R. L. Page of St. Charles, in the practice of medicine.

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Dr. William N. Freeman, Jr., of Perham, Minnesota, was married May 7, 1938, to Miss J'Austa White of Colfax, Washington.

* * *

Dr. A. W. Pasek, who has been practicing medicine at Lismore for the past year, has moved to Cloquet, where he will open offices.

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Dr. E. M. Howg of Lennox, South Dakota, has located at Hills, for the practice of medicine. Dr. Howg was formerly a member of the Mayo Clinic staff.

* * *

Dr. Charlotte Miller of Fargo, North Dakota, is the first woman to finish a year's internship at St. Joseph's Hospital in Saint Paul. She received her diploma early in May.

* * *

Dr. Stella Wilkinson has located at Askov, where she will practice medicine. She is a graduate of the University of Minnesota and has recently been practicing medicine in Duluth.

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Dr. Lyle Joseph Hay of Minneapolis was married on April 16 to Miriam Ilona Raihala, daughter of Dr. and Mrs. John Raihala of Virginia. Dr. Hay is at present an interne at General Hospital in Minneapolis.

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Dr. W. C. Kaufman of Appleton has announced the addition of Dr. Frank E. Lipp on the staff of the Kaufman Hospital. Dr. Lipp was formerly resident physician at Neurological Hospital on Welfare Island, New York City.

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Dr. D. C. Balfour and Dr. J. de J. Pemberton of Rochester attended the meeting of the Society of Clinical Surgery in Chicago, April 29 and 30. Dr. Balfour also attended the meeting of the American Surgical Association in Atlantic City early in May.

* * *

Dr. Ambrose Sprafka has opened an office in St. Cloud for the practice of medicine. Dr. Sprafka is a graduate of the University of Minnesota School of Medicine, and has just completed an internship at the Hospital St. Anthony De Padua in Chicago.

Dr. Dimitri Kalinoff of Stillwater was named to the Stillwater American Legion's Hall of Fame at a banquet held at the Lowell Inn early in May. Dr. Kalinoff was selected for his "unselfish service, without thought of gain" to the community within the past five years.

* * *

Dr. and Mrs. Owen W. Parker of Ely have returned from a recent automobile tour of the southern states, visiting all the Lincoln shrines and many other historic spots. One especially interesting to physicians was the home of Dr. Ephriam McDowell at Danville, Kentucky, where Dr. McDowell performed the first laparotomy in 1809.

* * *

Dr. and Mrs. John S. Lundy of Rochester returned from a three months' European trip, May 27. They toured Italy, Hungary, Germany, Holland, Belgium, France and England. Dr. Lundy was very favorably impressed with the work being done by European physicians as evidenced in the various clinics he attended while there.

* * *

Dr. H. L. Williams of Rochester attended the meeting of the American Laryngological, Rhinological and Otological Society, held in Atlantic City the last week in April, where he appeared on the program, and also attended the meetings of the American Laryngological Association and the American Otological Society, held the following week.

* * *

Dr. H. I. Lillie of Rochester attended the meeting of the American Laryngological, Rhinological and Otological Society held in Atlantic City the last week in April. Dr. Lillie was elected president of the Society at the last meeting. Dr. Lillie also took part in discussions at the meetings of the American Laryngological Association and the American Otological Society, held the first week in May.

* * *

The physicians in the Red Wing territory connected with St. John's Hospital were entertained at a banquet in St. James Hotel dining room on April 19, with members of the hospital board as hosts. The group included over fifty local physicians, and their wives. Dr. Branton of Willmar delivered the principal address of the evening. Dr. L. E. Claydon of Red Wing showed moving pictures taken on his recent trip to Mexico and South America.

* * *

Dr. Theodore Erickson of Montreal, son of Professor and Mrs. T. A. Erickson of Saint Paul, was married May 24 to Miss Mary Rachel Harrower, daughter of Mr. and Mrs. James Harrower of Cheam, Surrey, England. Dr. Erickson is a University of Minnesota graduate and at present is assistant neurosurgeon at the Montreal Neurological Institute of McGill University. Miss Harrower is a graduate of the University of London and obtained her Ph.D. from Smith College. She has been a research fellow in the Neurological Institute.

HOSPITAL NOTES

The Nagel Hospital at Waconia has recently installed a new deep therapy x-ray unit.

* * *

Dr. Peter Ward, superintendent of the Miller Hospital, Saint Paul, was installed as president of the Minnesota Hospital Association at the close of the association's convention at the Nicollet Hotel, Minneapolis, May 21. Other officers elected were A. G. Stasel, Minneapolis, president-elect; Miss Amy Gunderson, Benson, first vice president; Dr. T. E. Broadie, Saint Paul, second vice president; Roy M. Amberg, Minneapolis, treasurer; and Arthur M. Calvin, Saint Paul, secretary.

New members of the board of directors are Miss Mabel Korsell, Grand Rapids; J. H. Mitchell, Rochester; Miss Esther Wolfe, Minneapolis; Dr. M. J. Hauge, Jr., Clarkfield; and Sister M. Patricia, Duluth.

Dr. A. F. Branton, of Willmar, was named delegate to the American Hospital Association for two years.

Eleven Deaths From a Cancer Treatment

In October, 1935, when the "Ensol" treatment was launched from Kingston, Ont., with what appeared to be carefully planned publicity in the newspapers, *The Journal* issued a warning to the effect that the product was being developed under uncontrolled conditions and that its exploitation would inevitably lead to grief for those concerned. Nevertheless a considerable number of doctors in various parts of the United States have used a product of this type in the treatment of cancer and it is obvious that one at least has come to grief. It seems that the Biochemical Research Foundation of the Franklin Institute of Philadelphia prepared the product called B or Rex, which caused the deaths of 11 patients in Orlando, Fla. It seems likely that batch 152 was prepared on a Friday, some of it permitted to stand over Saturday and Sunday, and then sterilized on Monday. If the tetanus organism was present in the product it would have had two days in which to develop the toxin, so that when the product was sterilized on Monday a sufficient amount of tetanus toxin was present to cause death. These possibilities remain to be confirmed by more evidence—but certainly enough evidence is available to warrant the suggestion. At present there are being exploited to the American people a half dozen or more treatments of cancer that are in no way established as actually of value in the treatment of that condition. Enough is now known about the nature of cancer to indicate that the value of a cancer remedy cannot be established by sending it at random to physicians scattered all over the country, who use it in practice for a fee. The development, exploitation and promotion of "Ensol" and of its progeny "B" have been unscientific, unethical and unwarranted.—(J.A.M.A., April 9, 1938, p. 1194.)

MINNESOTA STATE MEDICAL ASSOCIATION

Eighty-Fifth Annual Session

June 29, 30 and July 1, 1938

Duluth, Minnesota

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Commercial Exhibits—W. N. GRAVES, D. R. GOLDISH, M. F.
FELLOWS.
Hotel Reservations—K. R. FAWCETT, N. J. BRAVERMAN.
Reunions—MARIO FISCHER, RALPH ECKMAN, S. MUELLER.
Golf—W. E. HATCH, W. D. COVENTRY.
Banquet—L. R. GOWAN, F. J. ELIAS, A. O. SWENSON.
Boat—W. C. MARTIN, C. H. MEAD, A. J. SPANG.
Clinical Programs—E. L. TUOHY, A. C. HILDING, M. H. TIB-
BETTS, G. A. HEDBERG, W. E. HATCH, S. H. BOYER, JR.,
F. J. HIRSCHBOECK, C. O. KOHLER, T. O. YOUNG, B. F.
DAVIS, J. R. MANLEY.

ANNOUNCEMENTS

Luncheons.—Two Round Table Discussion Luncheons have been arranged as a special feature of this meeting. The main dining room of the hotel has been reserved for these luncheon meetings. Tickets may be purchased at the time of registration and at the door.

Wednesday.—The luncheon at 12:30 p.m. will be devoted to discussion of Social Hygiene, particularly to lay education on prevention and treatment of venereal disease. W. A. O'Brien, University of Minnesota, will be principal speaker and discussion leader.

Thursday.—The luncheon at 12:30 p.m. will be devoted to discussion of subjects introduced during the Thursday morning session. The morning speakers, including the guest speaker, Dr. Lewin, will be present to answer questions. Dr. O'Brien will be discussion leader.

Friday.—The luncheon period, beginning at 12:30, will be devoted to the first Herman M. Johnson Memorial Lectureship. First lecturer is the Honorable Elmer A. Benson, Governor of the State of Minnesota, and long time friend of Dr. Johnson. J. M. Hayes, president of the Minnesota State Medical Association, will preside and introduce the lecturer. Every member is urged to attend.

* * *

Public Health Meeting.—The public will be invited to attend the Public Health Meeting arranged for Wednesday night at the Orpheum theater, next door to hotel headquarters. Dr. Haggard, famous physiologist and radio speaker, author of the celebrated series "Devils, Drugs and Doctors," and Irvin Abell, Louisville, Ky., president-elect of the American Medical Association, will be the principal speakers.

* * *

The Minnesota Academy of Ophthalmology and Otolaryngology will hold a special dinner meeting at the Kitchi Gammi Club in Duluth on Friday, July 1, in honor of Edward Jackson, of Denver. Dr. Jackson will speak Wednesday at 4 p.m. before the Minnesota State Medical Association and, under the sponsorship of the Academy, he will also give a course of lectures Thursday, Friday and Saturday, June 30, July 1 and 2 on "Practical Aspects of Physiological Optics in Refraction," at St. Mary's Hospital. Registration for this course should be made with F. N. Knapp, 815 Medical Arts Building, Duluth. The fee is \$15.

* * *

The Southern Minnesota Medical Association, following its regular annual custom, will present a gold medal to the individual physician who presents the best scientific exhibit at this meeting. Judges will be selected from among distinguished out-of-state visitors. The award will be made at the annual banquet in the Ballroom, Thursday night.

* * *

Annual Banquet.—The annual dinner for members and their wives, which was discontinued for a few years owing to lack of proper facilities, will be resumed again this year. It will be held Thursday at 6:30 p.m. in the Ballroom at the Hotel Duluth. Our celebrated guest speaker, Dr. Haggard of Yale, will be the principal speaker. Dancing in the Ballroom will follow dinner.

* * *

Golf Tournament.—The annual Golf Tournament will begin Saturday morning, July 2, at the Northland Country Club. Registrations for the tournament should be made at the Registration Desk. Entrants will be permitted to organize their own foursomes on a handicap basis. This is the first time the tournament has

EIGHTY-FIFTH ANNUAL SESSION

been staged at a time when there will be no conflict with other meeting events. Attractive prizes are offered.

VISITING SPEAKERS

Irvin Abell, President-elect of the American Medical Association and Professor of Clinical Surgery at the Medical School of the University of Louisville, Louisville, Kentucky.

Roland S. Cron, Obstetrician and Gynecologist at Columbia and Milwaukee Hospitals, Milwaukee, Wisconsin.

Hollis E. Potter, Head of X-ray Departments of Cook County and Presbyterian Hospitals, Chicago, and former President of the American Roentgen Ray Society and the Chicago Roentgen Ray Society. Sponsored by the Minnesota Radiological Society, Dr. Potter will deliver the annual Russell D. Carman Lecture.

Edward Jackson, Professor Emeritus of Diseases of the Eye, Philadelphia Polyclinic and the University of Colorado, Denver, Colorado.

Philip Lewin, Professor of Orthopedic Surgery, Cook County Graduate School of Medicine, and Attending Orthopedic Surgeon, Cook County and Michael Reese Hospitals, Chicago, Illinois. Sponsored by the Northern Minnesota Medical Association.

Karl Meyer, Medical Superintendent of Cook County Hospital, Chicago, Illinois.

E. K. Marshall, Jr., Professor of Pharmacology and Experimental Therapeutics, The Johns Hopkins University, Baltimore, Maryland. Sponsored by the Minnesota Society of Internal Medicine.

Howard W. Haggard, Associate Professor of Applied Physiology, Sheffield Scientific School, Yale University, New Haven, Connecticut.

C. Anderson Aldrich, Professor of Pediatrics, Northwestern University Medical School, Evanston, Illinois.

BUSINESS PROGRAM

HOTEL DULUTH

Tuesday, June 28

11:30 A.M.—Council	Room 118
3:00 P.M.—House of Delegates	Ballroom
4:00 P.M.—Reference Committees	Ballroom
5:00 P.M.—Council	Room 118
7:30 P.M.—House of Delegates	Ballroom
(reconvened)	

Wednesday, June 29

Council	Room 118
(At call of chairman)	
6:00 P.M.—House of Delegates	Ballroom

Thursday, June 30

Council	Room 118
(At call of chairman)	

Friday, July 1

Council	Room 118
(At call of chairman)	
11:00 A.M.—Installation of Officers.	
Report of Secretary.	

JUNE, 1938

SCIENTIFIC PROGRAM

Wednesday, June 29, 1938

Chairman: S. R. MAXEINER

Scientific Cinema:

Torek Operation for Cryptorchidism
WALTMAN WALTERS, Rochester

Obstetrical Hemorrhages

R. E. SWANSON, Minneapolis

Discussion: A. K. STRATTE, Pine City

Nutrition in Obstetrics

R. J. MOE, Duluth

Discussion: E. C. HARTLEY, St. Paul

Heart Disease in Pregnancy

J. F. BORG, St. Paul

Discussion: E. M. KASPER, St. Paul

Inflammatory Lesions of the Cervix and Vagina

L. W. BARRY, St. Paul

Discussion: W. F. MERCIL, Crookston

Scientific Cinema:

Congenital Absence of the Vagina—A New Surgical Treatment

V. S. COUNSELLER, Rochester

Carcinoma of the Colon and Rectum

IRVIN ABELL, Louisville, Ky.

Uterine Malignancy

ROLAND S. CRON, Milwaukee, Wis.

Round Table Luncheon:

Social Hygiene

Leader: W. A. O'BRIEN, University of Minnesota

Wednesday Afternoon

Chairman: B. B. SOUSTER

Scientific Cinema:

The Management of—Cancer of the Maxillary Sinus
Cancer of the Larynx

LAWRENCE R. BOIES, Minneapolis

Russell D. Carman Memorial Lecture:

The Diagnostic Roentgenology of Adult Pulmonary Tuberculosis with a New Suggestion as to Group Survey

HOLLIS E. POTTER, Chicago. Head, X-ray Departments Cook Co. and Presbyterian Hospitals

The Value of the X-ray in General Practice

C. G. SUTHERLAND, Rochester

Roentgen Therapy in Inflammatory Conditions

T. GAGE CLEMENT, Duluth

Scientific Cinema:

Eye Operations

CHARLES N. SPRATT, Minneapolis

Recognition and Treatment of Refractive Errors in Children

EDWARD JACKSON, Denver

Acute Mastoiditis

J. G. PARSONS, Crookston

Discussion: W. E. CAMP, Minneapolis

Eye Injuries

W. T. WENNER, St. Cloud

Discussion: E. P. BURCH, St. Paul

Wednesday Evening

PUBLIC HEALTH MEETING

Presiding Officer: M. G. GILLESPIE, Duluth

President St. Louis County Medical Society

Greetings

CARL SCHERER, Duluth. President, St. Louis County Tuberculosis and Health Society

Songs by the Normanna Male Chorus

EIGHTY-FIFTH ANNUAL SESSION

Recent Advances in Medicine and Their Social Significance

HOWARD W. HAGGARD, New Haven, Conn.

Some Aims of the Profession as They Relate to the Public

IRVIN ABELL, Louisville, Ky.

Motion Picture: Emergency Treatment for Fractures

Thursday, June 30, 1938

Chairman: V. S. COUNSELLER

Scientific Cinema:

Os Calcis Fractures—An Improved Treatment

O. W. YOERG, Minneapolis

Fractures: General Principles

CLARENCE JACOBSON, Chisholm

Discussion: E. E. CHRISTENSEN, Winona

Emergency Treatment of Injuries

H. M. LEE, Minneapolis

Discussion: BENJAMIN F. DAVIS, Duluth

Abdominal Injuries

E. MENDELSSOHN JONES, St. Paul

Discussion: W. C. BERNSTEIN, New Richland

Intractable Low Back and Sciatic Pain Due to Protruded Intervertebral Disks: Diagnosis and Treatment

J. G. LOVE, Rochester

Discussion: HAROLD O. PETERSON, Minneapolis

Scientific Cinema:

Complete Rectal Prolapse—A Fascial Repair

C. W. MAYO, Rochester

Practical Pointers on Anesthesia

RALPH T. KNIGHT, Minneapolis

Discussion: E. B. TUOHY, Rochester

Rating of Disabilities

M. O. HENRY, Minneapolis

Discussion: R. M. BURNS, St. Paul

The Foot and Ankle—Their Discomforts, Deformities and Disabilities

PHILIP LEWIN, Chicago, Ill.

Round Table Luncheon:

Informal Discussion on Morning Program

Leader: W. A. O'BRIEN, University of Minnesota

Thursday Afternoon

Chairman: P. G. BOMAN

Scientific Cinema:

The Transportation of the Patient with Fractured Spine

M. H. TIBBETTS, Duluth

Recent Advances in the Treatment of Burns

KARL A. MEYER, Chicago, Ill.

The Problem of Gastroduodenal Hemorrhage

A. M. SNELL, Rochester

Discussion: P. W. HARRISON, Worthington

Scientific Cinema:

Methods Used in Internal Fixations in Fractures of the Neck of the Femur

WILLARD D. WHITE, Minneapolis

Sulfanilamide in Bacterial Infections

E. K. MARSHALL, JR., Baltimore

A Type of Chronic Nervous Depression in Women with Response to Thyroid Medication

G. R. KAMMAN, St. Paul

Discussion: L. R. GOWAN, Duluth

What's New in the Treatment of Food Sensitiveness?

W. C. ALVAREZ, Rochester

Discussion: E. M. RUSTON, Minneapolis

Thursday Evening

ANNUAL BANQUET, BALLROOM

Toastmaster: J. M. HAYES

Introduction of Mrs. W. B. Roberts, Minneapolis, President Women's Auxiliary

Presentation of Southern Minnesota Medical Association medal

Greetings

IRVIN ABELL, Louisville, Ky.

Address

HOWARD W. HAGGARD, New Haven, Conn.

Dancing

Friday, July 1, 1938

Chairman: J. N. LIBERT

Scientific Cinema:

Ocular Aspects of Diabetes

WALTER H. FINK, Minneapolis

Clinics

Miller Memorial Hospital

St. Luke's Hospital

St. Mary's Hospital

Scientific Cinema:

Emergency Care of Traumatic Injuries to the Extremities

H. B. MACEY, Rochester

Installation of Officers

Presiding: J. M. HAYES, President

Report of the Secretary

Medical Economics

Presiding: W. R. MCCARTHY, First Vice President

Address

HON. HENRY M. GALLAGHER, Waseca. Chief Justice, Supreme Court, State of Minnesota

Address

MR. S. B. HOUCK, Minneapolis. Chairman, Committee on Unauthorized Practice of the Law, American Bar Association

President's Address: Medical Problems in Minnesota

J. M. HAYES, Minneapolis

Luncheon:

Herman M. Johnson Memorial Lectureship

THE HONORABLE ELMER A. BENSON, Governor of the State of Minnesota

Friday Afternoon

Chairman: R. C. HUNT

Scientific Cinema:

Lumbar Ureterotomy for Stone—New Method and Technic

F. E. B. FOLEY, St. Paul

Some Practical Points in the Management of Nephritic Children

C. ANDERSON ALDRICH, Winnetka, Ill.

Acute Upper Respiratory Infections with Gastrointestinal Symptoms

E. D. ANDERSON, Minneapolis

Discussion: L. R. CRITCHFIELD, St. Paul

Peripheral Neuritis in Children

R. E. CUTTS, Minneapolis

Discussion: J. C. MCKINLEY, Minneapolis

Congenital Heart Defects

T. J. DRY, Rochester

Discussion: R. N. ANDREWS, Mankato

Scientific Cinema:

Transplantation of the Ureters to the Sigmoid for Exstrophy of the Bladder

P. F. DONOHUE, St. Paul

Treatment of Upper Respiratory Infections

R. L. J. KENNEDY, Rochester

Discussion: ANDREW SINAMARK, Hibbing

PROCEEDINGS of the MINNESOTA ACADEMY OF MEDICINE

Meeting of March 9, 1938

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, March 9, 1938. Dinner was served at 7 o'clock and the meeting was called to order at 8:10 p. m. by the president, Dr. R. T. LaVake.

There were forty-six members present.

Minutes of the February meeting were read and approved.

The scientific program followed.

OPERATIVE DIVISION OF UNILATERAL FUSED KIDNEY*

With Case Report

F. E. B. FOLEY, M.D.
Saint Paul

Abstract

The case to be reported is that of a unilateral fused kidney.

Brief lantern slide demonstration of the development of the upper urinary tract, at the same time pointing out the fault in normal development that gives rise to the anomaly of unilateral fused kidney, will add interest to description of the condition as clinically encountered. It should also make clear the features of the bilateral pyelo-ureterogram by which the condition is recognized. (Lantern slides.)

Unilateral fused kidney or "tandem kidney" or "crossed dystopia with fusion" is primarily an anomaly of the renal blastemata. It is one of the so-called fusion anomalies. Other anomalies of the same group are "horseshoe kidney" (fusion of lower poles usually, upper poles rarely) and "lump kidney" (conglomerate fusion). In unilateral fused kidney there is fusion between the lower pole of one kidney and the upper pole of the second kidney. The fused kidneys both lie to one side of the midline. Thus one kidney is ectopic across the midline. Almost regularly the lower kidney is the ectopic one and the fusion is at its upper pole. The ureter of the ectopic kidney crosses the midline to enter the bladder in normal position. Rarely the upper one of the two kidneys is the ectopic one. Only a few cases of this latter relationship have been reported.

The permanent kidney is formed from two elements. The ureteral bud arising from the Wolffian duct forms the excretory channels including almost the whole length of the tubules, papillary ducts, minor calyces, major calyces, pelvis and ureter. By branching growth the ureteral bud extends into and is covered by the renal blastema. The renal blastemata or nephrogenic cords are masses of mesodermal cells lying dorsal to the Wolffian ducts, one on each side, and entirely separate from the Wolffian ducts. From the renal blas-

tema are developed the glomeruli and short connecting tubes that unite with the tubules formed from the ureteral bud.

At beginning formation of the permanent kidneys the two caudally placed renal blastemata lie close to each other but normally are completely separate. So far as I know it has not been determined just how and when fusion occurs, whether it is a primary fault in the formation of the blastemata, and present before the migration of the kidneys begins, or occurs during migration, particularly as the kidneys approach each other in passing through the narrow ring formed by the umbilical arteries.

Normally the migration of the kidney has three components of motion: ascent, rotation and axial deflection.

1. *Ascent*.—Normally the kidneys ascend to positions well up in the lumbar regions—the renal fossæ. When all possible ascent of the unilateral fused kidney has occurred its elongated form leaves its lower segment in abnormally low position. In addition the lower segment is drawn across the midline by the upper segment.

2. *Rotation*.—Normally the kidney rotates on its long axis so that the hilum, originally directed ventrally, is finally directed medially with the calyces extending laterally from the pelvis. Fusion of the two organs impairs this rotation particularly at the fused poles. In consequence some of the calyces of the unilateral fused kidney extend medially from the pelvis.

3. *Axial Deflection*.—Normally the long axis of the kidney, at first oblique toward the midline below, is deflected during migration to become oblique toward the midline above with the upper pole lying closer to the midline than the lower pole. Fusion of the two organs interferes with this normal axial deflection. In consequence, the long axis of the upper segment of the unilateral fused kidney remains oblique toward the midline below, the lateral movement of the lower pole being arrested by the fusion.

Because of these faults in development the "bilateral" pyelogram of a unilateral fused kidney with crossed ectopia of the lower segment representing the left kidney will show an upper (right) pelvis perhaps normally high in the renal fossa with its long axis oblique toward the midline below and its inferior calyces extending medially from the pelvis. The lower (left) pelvis will be abnormally low-lying, its axis extending obliquely downward from the lower pole of the upper (right) pelvis and even reaching somewhat across the midline while its ureter, crossing the midline, terminates in normal position in the left side of the bladder.

Case Report

The case to be reported is that of an unmarried woman, aged eighteen (Ancker Hospital record No. A-73402.)

*Dr. Foley gave a motion picture demonstration of the operation.

The complaint was of left sided abdominal pain which had been present in variable degrees during the three years prior to her first admission to the hospital in August, 1936. At first the pain occurred in attacks. It was very severe, located in the left upper quadrant, appeared to be induced by exercise or other activity and to be relieved by lying down. At times the pain extended to the left lower thorax and to the left upper quadrant of the abdomen. Later constipation accompanying the attacks was noted. Weight loss of 15 pounds occurred.

Following almost complete relief of symptoms for a period of eight months the patient was admitted to the hospital for the third time, June 4, 1937. On this occasion there had been an attack of severe pain in the left lower quadrant followed by frequent periodic recurrences and finally by constant and persistent dull aching pain in this location. She was transferred to the urologic service.

The significant findings of the physical examination and laboratory investigations were: a rounded somewhat elongated mass lying below the umbilicus with its long axis extending longitudinally. The mass was slightly moveable in longitudinal direction and was tender to pressure. The mass transmitted the aortic pulsation but did not expand with it. On percussion, bowel tympany was present over the mass. The urine was normal, hemoglobin 57 per cent, leukocytes 3,600 per cu. mm., blood urea nitrogen 13.3 mgms. per 100 c.c. Excretion urogram: nearly normal function of each kidney; indefinite outlining of pelvis and ureters with deformity typical of unilateral fused kidney with crossed ectopia of the left and lower segment. Cystoscopy: normal bladder mucosa and contour; ureteral orifices normal position and normal appearance. Indigo-carmin test of renal function: right—appearance time four minutes, deep concentration; left—appearance time seven minutes, moderate concentration. Bilateral pyelogram: clear outlining of deformity typical of unilateral fused kidney with crossed ectopia of the left and lower segment, no dilatation of the right pelvis or calyces, grade I dilatation of the left pelvis and calyces. Filling of the pelvis of the left segment produced pain identical with the pain complained of both as to character and location.

Diagnosis and summary of findings: Unilateral fused kidney with crossed ectopia of left and lower segment not accompanied by any significant pathologic change apart from the anomaly and responsible for painful symptoms.

Therapeutic indication: Operative division of the renal isthmus and correction of renal malposition.

A color motion picture film of the operation will now be shown. The malformed kidney was exposed through an extra-peritoneal right flank incision. The isthmus was divided between two rows of mattress sutures. The left kidney was displaced to the left and its upper pole was held medial to the vena cava by suturing the posterior parietal peritoneum to the posterior abdominal wall along the right border of the cava, the right kidney was fixed in normal position by the Foley nephropexy (Arch. Surg., 1929).

The result to date, ten months after operation, is excellent, there being complete relief of the pain complained of before operation. A bilateral pyelogram made two months following operation showed the right kidney and pelvis in normal position and of normal appearance and the position of the left pelvis somewhat improved.

At the time this operation was performed a cursory review of the literature disclosed no other case of division of the isthmus of the unilateral fused kidney without removal of one or the other half. Since

then further search has disclosed a total of fifty-one cases of operation on the unilateral fused kidney, most of them undertaken for concomitant pathologic change such as stone, hydronephrosis, etc. However, among the fifty-one cases, four cases of operation similar to that here reported were found.

In addition to this case of operative division of the isthmus of the unilateral fused kidney, we have performed the same operation in six cases of horseshoe kidney with equally satisfactory results in all save one case in which an unremoved stone and persisting infection made secondary nephrectomy necessary on one side.

It is submitted that unilateral fused kidney or horseshoe kidney causing only painful symptoms and not accompanied by pathologic change apart from the anomaly should be the object of surgical interference of the sort described here.

Discussion

DR. W. F. BRAASCH, Rochester: I am compelled to say a few words of commendation and praise for the excellent presentation made by Dr. Foley and the unusual operation that he described. I remember that I discussed his paper on the separation of the isthmus with renal fusion four years ago and at that time I praised him for his originality; and now I again do so.

We urologists used to think that we were quite clever to make the clinical diagnosis of fused kidney prior to operation. Today it is getting to be an old story. Patients now come in frequently with the diagnosis already made by the local physician, by means of excretory urography. By employing this simple method of diagnosis it is no longer difficult to recognize renal fusion. On reviewing our records at the Clinic the other day, I found that during the past year a diagnosis of renal fusion was made in thirty-two cases. In a paper written by Judd, Scholl and myself some sixteen years ago, we described sixteen cases of renal fusion which had been operated on at the Mayo Clinic. One case among those reported (case No. 3) was operated on by Dr. C. H. Mayo in 1917, in which he made the first symphysiotomy for horseshoe kidney reported in this country. Rovsing first described this operation in 1910 and Papin later improved the operative technic. As far as I know, division of a unilateral fused kidney has not been done at the Clinic. We have operated on unilateral fused kidneys for such complications as stone and hydronephrosis, but have not bisected the kidney as Dr. Foley has described. Not all kidneys with unilateral renal fusion can be divided. In some cases the two renal pelves will be so closely related and the kidney assume such a shape that renal division will not be technically possible, or at least will offer considerable difficulty.

It should be remembered that there are difficulties in deciding whether a fused kidney should be operated. In many of our cases diagnosed clinically, we found no indication for operation. Apparent pyelectasis of moderate degree is often observed in the urogram with renal fusion, which has caused no symptoms. Although the pyelectasis in some cases is extensive, the patient has not complained of any pain. It may be difficult to determine whether actual stasis and obstruction are present. Patients also are observed who complain of pain but fail to show pyelectasis in the urogram. It can be very difficult to decide whether the apparent pyelectasis is the cause of the patient's symptoms. Of two cases in which the isthmus was

resected and the kidneys displaced, the pain persisted in one. In the other case the pain was relieved for several months and then returned. It should be remembered, before advising surgery, that many patients with renal fusion have no symptoms caused by the anomaly, which is discovered accidentally in the course of routine urography.

In closing, I wish to repeat that the operation Dr. Foley describes is a very interesting one and I congratulate him on the result obtained.

DR. F. R. WRIGHT, Minneapolis: It is always an interesting proposition to me why a patient will go on for forty or more years with an anatomical anomaly and then begin to develop symptoms. For instance, what change took place in this girl of 18 years that brought about the painful symptoms? She had had this condition all her life. Something had taken place which produced physiologic pain.

DR. FOLEY (in closing): It is always a pleasure to receive Dr. Braasch's compliments and have him make an interesting and instructive discussion of this sort. With the wealth of material that has gone through his hands, close attention must be paid to his views.

I did not intend to indicate by any means that every case of renal fusion encountered should be the object of surgical interference. There are many cases in which there is no associated pathologic change and pain is either absent or cannot be shown to be caused by the anomalous renal formation. Such cases provide no indication for surgical interference. As Dr. Braasch points out, it may be difficult to determine if there are adequate indications for operation. In this case of unilateral fused kidney and in the six cases of horseshoe kidney mentioned, pain of renal origin was present in all. In the present case and in five of the horseshoe kidney cases, division of the isthmus and nephropexy has given excellent results with complete relief of pain. I do not claim that the result in the case here reported is an eventual end-result, as only ten months have elapsed since operation. However, up to the time of the last report, three days ago, complete relief was still present.

Dr. Wright brings up a very interesting question. Why congenital renal anomalies remain symptomless for years and then suddenly cause pain I do not know. Dr. William Quinby, a competent observer, points out the very interesting fact that pain occasioned by anomalous renal vessels very frequently begins at the time full development is reached. Onset of pain at this same period of development is frequently observed with the other more extensive renal anomalies. It will be noted that in the present case the painful symptoms began at the age of fifteen, approximately the time that full development obtains in the female.

MALIGNANT HYPERTENSION

Report of Two Cases

HENDRIE GRANT, M.D.
Saint Paul

Dr. Grant, of Saint Paul, reported two cases as follows:

Case 1.—Mrs. W. S., widow, aged fifty-nine, first came for examination on December 16, 1937, complaining of poor vision which had begun approximately a week before. There was also an associated asthenia and vertigo. Previous history shows that fifteen years ago there was a sudden loss of vision in both eyes, which condition was treated by the late Dr. deSchweinitz of Philadelphia and at that time there were diffuse retinal hemorrhages and a blood pressure of over 200 systolic. After a period of rest in bed

of two months, the vision cleared up and became quite satisfactory again. There has been no visual difficulty from that time until the present, when on examination the vision was: Right 20/200, Left 20/50. Fundus examination at this time showed some lens and vitreous haze, diffuse retinal edema with marked arteriolar spasm, thickening of the larger arterioles, arteriovenous compression and an edema of one diopter of each optic nerve. There were hemorrhages and cotton-wool patches in the right macular area.

General examination revealed marked arthritic changes in the hands and knees. Heart enlarged about 50 per cent with a widened base and marked sclerosis of the peripheral vessels. There was a slight trace of albumin, a few red blood cells and hyaline casts present in the urine.

After a period of rest in bed for two months there was a marked improvement in the vision of the left eye, although the blood pressure was still 180 systolic and 110 diastolic.

Comment.—Following a rather severe angiospastic retinitis with systolic pressure of 200, there was a complete remission for a period of fifteen years. Although such remissions are not uncommon, and sometimes occur even in cases of malignant hypertension, the picture now present is undoubtedly one of a more serious condition. The arterial and arteriolar thickening, visual disturbances, arteriolar spasm and some demonstrable swelling of the optic nerves are characteristic of the condition present. Marked improvement which resulted from rest in bed, sedatives, and some reduction in the pressure itself, are the indications of a fair prognosis of this condition.

Case 2.—Mr. J. J., aged forty-three, first came for examination on December 28, 1937, complaining of loss of vision in the left eye for the past few weeks. There had been some difficulty with vision since early in the Spring and it was becoming increasingly difficult to work. Hypertension had been present for the last five years and in June was associated with anorexia, fatigue, vomiting and diffuse abdominal pain. There was a weight loss of 15 pounds. He was in the hospital for a short period in June recovering from an attack of bronchitis.

On examination the vision was: Right 20/20, Left 20/200. Fundus examination revealed that the right optic nerve showed three diopters of swelling with marked arteriolar spasms and hemorrhages around the disk. The larger vessels showed a thickening and arteriovenous compression. In the left eye only a moderate swelling of the disk was present without hemorrhages or exudate. Visual fields showed a contraction of the right with nasal hemianopia of the left eye. The blood pressure was 250 systolic over 150 diastolic. The urine showed a trace of albumin and occasional red blood cells. Kidney function was 57 per cent. After a period of rest in the hospital with the usual sedatives and spinal puncture, there was a slow but steady rise in the pressure to 260 systolic, 160 diastolic. Headaches became more severe and cotton-wool exudates appeared in the right eye.

Comment.—Hypertension, which had existed for several years, was accompanied a few months before examination by definite symptoms of general weakness with evidences of arteriolar spasm. There was no improvement whatever following glucose and sucrose intravenously and a definite increase in blood pressure seemed to follow spinal fluid drainage. All of these measures are oftentimes sufficient to produce a remis-

BOOK REVIEWS

sion of this condition, but at times the angiospastic feature of the condition is so pronounced that there is a sudden failure of the brain, heart or kidneys. It is difficult to explain the field changes or the hypertensive or fundus findings.

Discussion

DR. W. E. CAMP, Minneapolis: Dr. Grant has very thoroughly and very instructively presented these two cases of malignant hypertension. With his permission, I would like to show a few lantern slides completing the ophthalmoscopic picture in these types of cases and correlating these findings with the microscopic pathologic change which is usually present. These slides were made from serial sections of the eye of a case of malignant hypertension, which died a renal death. According to Dr. E. T. Bell, about 5 per cent of all cases of malignant hypertension die a renal death. The slides show a marked edema of the optic nerve and the surrounding retina with a small flat detachment of the retina on either side of the optic nerve. The marked sclerosis of the retinal and choroidal arterioles is well demonstrated. The thickening is chiefly in the intima and media and consists of fibrosis and hyaline deposits. The cotton-wool exudate in the superficial layers of the retina is found to be due to edema and serum deposits containing a few large phagocytes or macrophages. The "star-shaped" figure in the macular region is due to lipid exudate in the deeper layers of the retina. These exudates with the ophthalmoscope appear as small, yellowish-white, highly refractile bodies and form an incomplete "star" in the macular region. Fat stains show that they are lipoids in character and when once formed are more permanent than the soft cotton-wool patches described above. All of the above-described features compose the picture of the retinitis found in malignant hypertension.

DR. MOSES BARRON, Minneapolis: Dr. Grant's cases are interesting both from the point of view of the oculist and of the internist. It is rather unfortunate that the terminology is often confusing. The oculist's diagnosis of malignant hypertension usually applies to those cases in which there is hypertension and which develop retinal changes such as edema, narrowing of the arterioles, hemorrhages, edema of the disc, as described by Dr. Grant. The internist, on the other hand, generally uses the term to designate the type of case represented by Dr. Grant's second case, and the one illustrated by Dr. Camp; that is, malignant hypertension is meant to describe a case of essential hypertension which develops renal changes with renal insufficiency which usually results in death from uremia. Very commonly the characteristic retinitis picture is present. Dr. Camp mentioned that about 5 per cent of these cases die of uremia. From our point of view, about 95 per cent of these cases die of uremia. The renal changes are often characteristic. In a paper that was delivered before this Academy a year ago, I tried to point out the characteristic changes in the kidneys. The changes are degenerative; very pronounced are the changes in the arterioles with arteriolar necrosis. Dr. Grant's first case would be considered a case of essential hypertension with angiospastic involvement. Such cases often respond well to spinal drainage. His second case, in which the patient is progressively going down hill and in which there developed symptoms of uremia, is a typical case of malignant hypertension. Such cases do not respond very well to spinal drainage. I wonder if Dr. Grant would tell us on what basis he uses the term malignant hypertension.

DR. GRANT (in closing): I think that, for the purpose of differentiation, we have three types of hypertension: (1) essential hypertension, with no signs except or-

ganic changes in the vessels; (2) the acute vasospastic disease which one sees in pregnancy and occasionally in acute infections, in which there is sudden loss of vision accompanied by swelling of the disc, cotton-wool exudate and hemorrhages of the retina; these signs have been known to disappear even in instances when the condition is dependent upon an acute infection; and (3) malignant hypertension, in which the patient presents such general disturbances as asthenia, fatigue, or neurological signs associated with organic vascular changes, hemorrhages and exudate into the retina, arteriolar spasm and a demonstrable swelling of the optic nerve.

Approximately 80 per cent of cases of malignant hypertension live less than one year. There are several cases reported in which remissions lasting four and one-half years have been present. Dr. Wagener has recently reported six cases which have had prolonged remissions after the diagnosis was made. Many cases of malignant hypertension have microscopic or gross evidences of hematuria. In some instances there may be a very rapid degeneration, the individual living only a little more than a week.

The meeting adjourned.

A. G. SCHULTZE, M.D., *Secretary.*

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

PEDIATRIC NURSING. By John Zahorsky. 568 pp. \$3.00. St. Louis, Mo.: C. V. Mosby Co., 1936.

It would seem that texts for nurses, if compiled by physicians, tend to become abbreviations of like volumes for physicians. More attention to nursing technic would seem indicated, inasmuch as this is of particularly specialized nature in relation to pediatrics. In general this volume seems but little different from many others of its kind, and gives in brief form a discussion of the more common child ailments.

THOMAS MYERS, M.D.

EXAMINATION OF THE PATIENT AND SYMPTOMATIC diagnosis. John Watts Murray. 2nd ed. \$10.00. 1219 pps. St. Louis: Mosby, 1936.

This is a large and detailed monograph on physical diagnosis, which should be very useful in looking up any group of symptoms.

It is divided into two sections: Section 1 giving the details of history-taking, covering all parts of the body and calling attention to the symptoms to be looked for and listing the causes for such symptoms; Section 2 considering the various systems or sections of the body and the disorders to which they are liable.

Numerous illustrations and diagrams add to its usefulness. The index is fair, but the table of contents is very full and between the two one can find any symptom. The book's completeness and form make it valuable for reference and not for general reading.

E. E. SCOTT, M.D.

MINNESOTA MEDICINE

MINNEAPOLIS SURGICAL SOCIETY

Stated Meeting, Thursday, April 7, 1938

MESENTERIC CYST

Case Report

W. C. PETERSON, M.D.

The first case of mesenteric cyst was observed in 1507 by Benevieni, a Florentine anatomist, who accidentally found such a cyst at autopsy and classified it as an anatomical curiosity. In 1880 Tillaux successfully operated on a cystic mesenteric tumor.

Mesenteric tumors are the rarest tumors in the abdomen but cystic tumors are four times as common as the solid neoplasms.

In a very complete article and bibliography by Dr. J. Ogle Warfield, Jr., from which I have very lavishly drawn my information, it is stated that probably 500 cases have been reported in the literature up to 1932.

Briefly, mesenteric cysts may be classified according to origin as follows:

1. Embryonic retroperitoneal organs, such as germinal epithelium, ovary, wolffian or müllerian bodies.
2. Displaced embryonal intestinal tissue.
3. Dermal inclusions.
4. Angiomas of blood and lymph vessels.
5. Parasitic and bacterial infection.
6. Necrosis of lymph glands or solid tumors.
7. Trauma and foreign bodies.

Mesenteric cysts occur most commonly in the fourth decade and women are affected twice as often as men.

Diagnosis.—There are no pathognomonic signs or symptoms of mesenteric cyst. However, an abdominal tumor which is rounded, cystic, mobile and not tender, should suggest such a cyst. The mobility is the outstanding sign. These cysts are located most commonly in the mesentery of the ileum and next most frequently in the jejunum, cecum, ascending and transverse colon.

Pathology.—These cysts may be so small as to be unrecognized, or so large they fill the entire abdomen. The cyst wall is usually composed of fibrous or elastic tissue with the lining so compressed that its cellular structure cannot be identified. Only occasionally is some tissue present which will identify the origin of the neoplasm. Malignancy is rare.

Complications.—Intestinal obstruction is the most common complication, occurs in one-third of the cases and of these the mortality is 50 per cent. Peritonitis, hemorrhage into the cyst, rupture into the bowel, torsion and impaction have all been reported.

Treatment.—1. Enucleation is the operation of choice and has the lowest mortality, 9 per cent.

2. Enucleation with intestinal resection, 16.6 per cent.

3. Drainage or marsupialization has been done in some cases.

4. Aspiration.

Report of Case

A white spinster, seventy-five years of age, was seen October 4, 1937. Her past history was entirely irrelevant.

The patient had noticed a swelling in the abdomen for about three years. It was entirely painless and only troubled her by being in the way in adjusting her clothing.

Examination showed a very well preserved elderly woman, with normal findings except for a rounded protruding abdominal mass, not unlike a seven months pregnancy in a sparsely nourished woman. The mass was not tender and was very freely movable.

Vaginal examination showed a small uterus.

Diagnosis: Large pedunculated ovarian cyst or fibroid.

Operation: A midline incision was made and on examination the tumor was readily seen to be in the transverse mesocolon. The posterior layer was incised and the cyst was dissected out quite readily except near the transverse colon. The thin areas in the colon were plicated, the rent in the mesentery closed and the abdomen sutured. The cyst was thin walled, weighed 2125 grams, was 15 cm. in diameter, and contained over 2 litres of bloody fluid.

Recovery was uneventful.

References

1. Peterson, Edward W.: *Ann. Surg.*, 96:340, 1932.
2. Warfield, J. Ogle, Jr.: *Ann. Surg.*, 96:329, 1932.

Discussion

Dr. Martin Nordland showed slides demonstrating a case of mesenteric cyst. The case was previously reported before this Society.

DR. J. F. CORBETT: I have a case perhaps worth reporting from the standpoint of its unusual location. Like the essayist, I did not make a diagnosis beforehand. The tumor in this case I could feel but it did not seem to me at all movable. I expected to find something connected with either the tube or the ovary. When I opened the abdomen I found a cyst between the layers of the sigmoid at a very low level, practically where the mesentery comes down. I then recognized I was dealing with a cyst, thin-walled, and probably two or two and one-half inches in diameter.

In getting this out I found that because of the anatomical location the cyst had pushed its way somewhat into the bowel, leaving a paper thin mucosa only, so much so that I was afraid to close it without resecting the bowel. I therefore took out a complete segment of bowel and succeeded in making an end-to-end anastomosis. The pathologist reported a thin-walled cyst, undoubtedly embryonic in origin.

RECTO-URETHRO-VESICAL FISTULA, TRAUMATIC

Case Report

ROBERT F. MCGANDY, M.D.

The case I wish to report is that of a laborer, thirty-three years of age, whom I first saw in a rural hospital in Wisconsin, on September 26, 1932. He gave a history of slipping, falling backwards six feet, striking on a bolt which protruded eleven inches from a log. The bolt entered his perineum behind the rectum and went into the rectum in a somewhat sweeping fashion, penetrating the prostatic urethra and bladder. He bled considerably and was taken immediately to the hospital where he was seen by a doctor from a neighboring town. He was taken immediately

to the operating room where the doctor's examination revealed a large tear in the perineum, a three-inch tear in the posterior wall of the rectum and a six-inch tear in the anterior wall of the rectum. The doctor stated he could put his hand into the wound and noticed that the prostatic urethra had been torn for a distance of about one inch and a considerable amount of prostatic tissue had been torn away. The wound entered the bladder and urine could be seen coming out of it. The doctor attempted immediate repair of the rectum and let the rest of the wound fall together. That night, when the regular doctor at the hospital returned, the accident having happened at 8:40 in the morning, it was noticed that the patient was unable to void. The doctor was unable to pass a catheter and for this reason opened the bladder suprapubically and was able with difficulty to institute drainage through the urethra. He also left a drain in the suprapubic opening. The patient's temperature had been 102 for several days and his leukocyte count was 13,200. When I saw him, his temperature was between 99 and 100. The doctor had been irrigating the bladder daily. Urine was coming from the abdomen and urethra as well as the rectum. The patient was very restless, in extreme pain, markedly dehydrated and very toxic. An examination revealed a large three-inch long, foul smelling, pus discharging wound in the perineum and rectum. There was a tube inserted in the rectum and the stitches had sloughed away. As the patient could not be moved, I suggested more fluids, sedatives and hot packs to the perineum, in addition to what the doctor was already doing.

I saw the patient at the same hospital again on October 10, 1932. For the past five days the patient had had a high temperature and was suffering from a respiratory infection which proved to be pneumonia. He was still toxic and had a Vincent's infection in his mouth. Urine was coming from the abdomen and perineal wound. The urethra was not draining and the patient had a definite urethritis and epididymitis. Abscesses had formed in the shaft of the penis and drained pus. I felt the rectal wound had improved somewhat although the margins were angry. I could put my index finger in the rectal canal. I adjusted the catheter in the urethra and drainage was obtained through it. The blood chemistry was normal but the patient was becoming irrational at times. Definite suicidal tendencies had been noticed. The doctor stated that the patient had had voluntary stools. The urinary infection was apparently responding somewhat.

On November 17, 1932, this patient was transferred to the Northwestern Hospital in Minneapolis by ambulance. His temperature was 99 on admission and the patient presented the picture of exhaustion. He was discouraged and depressed. The nurse who came with him repeated the fact that he had many suicidal tendencies. He had a considerable amount of pain in his penis and perineum and he was poorly nourished. Urine drained suprapubically, through the catheter in the urethra as well as through the rectum. Urinalysis revealed a large amount of albumin with 50 to 75 pus cells per high powered field. There were two or three red blood cells per high powered field and many granular and hyaline casts. Wassermann reaction was reported to be negative. Hemoglobin was 74 per cent; red cells, 4,110,000; leukocytes, 16,500; non-protein nitrogen, 22.4 mgms. per 100 c.c.; creatinine, 1.2 mgms. per 100 c.c.

The patient was placed on regular bladder irrigations and urinary antiseptics. The urethral catheter was frequently changed and when out the fistulae in the shaft of the penis drained. He was also given hot packs to his genitals and perineum. Fluids were forced and although sedatives were given, little success resulted from them. The patient had frequent suicidal tendencies in the hospital and had to be watched constantly. The condition of his perineum and bladder gradually improved. On November 28, with the

aid of a rectal speculum, I was able to pass a rubber catheter into the fistula opening in the rectum up to the bladder. I repeated this procedure on November 30 and injected some silver iodide emulsion obtaining an x-ray picture demonstrating a fistulous tract into the bladder.

Irrigation and urinary antiseptics were continued until December 8 when this patient was taken to the operating room, where under general anesthesia a perineal racket-shaped incision was made. As was to be expected, a considerable amount of scar tissue had formed both in front and behind the rectum. The rectum was dissected with difficulty from the surrounding structures after the method used in the old Whitehead operation for hemorrhoids. The dissection was carried upwards to a point about two centimeters above the entrance of the fistulous tract into the rectum. I could readily pass two fingers into the sinus opening, which led from the rectum up to the region of the posterior urethra and bladder. The fistulous tract was used to close the opening in the bladder and posterior urethra. This was reinforced with what remained of the prostatic capsule. It was thought best to sacrifice the rectum below the sinus opening. A new rectum was therefore pulled down in the manner used in the Whitehead operation. The sphincter musculature was markedly atrophied, retracted and composed of a considerable amount of scar tissue. However, what remained was approximated as best possible. The wound was drained. Fresh catheters were placed in the suprapubic and urethral channels.

The patient was placed on a low residue diet and sedatives. He was given subcutaneous fluids and definite steps were taken to prevent him from having a bowel movement. His temperature went up to 101 for the first three days. On December 10, two days after the operation, the patient became irrational and remained so until the 16th of December. He had to be placed in a straight jacket on December 12. Five days after the operation, he had a bowel movement consisting mainly of old blood. His thrashing around in restraints opened the perineal wound slightly. He was seen on December 15 by Dr. Hamilton, who felt we were dealing with an acute toxic delirium which apparently started originally after his pneumonia. It subsided with hallucinations and suicidal tendencies running along, only to become acute again following his present operation. The restraints were removed, however, on the 17th of December, and the patient progressed quite well. I removed the suprapubic drain as soon as he became rational and on the 27th of December, I removed the catheter from his urethra. As I stated above he had several fistulae in his penis, one being at the scroto-perineal angle. When the catheter was removed from the urethra, urine drained from these fistulous tracts, but many of the fistulae in the shaft closed spontaneously. The rectal and suprapubic wounds closed normally and the patient was discharged from the hospital on January 18, 1933.

I did not see the patient again until February 7, 1933, when he returned from the country. He had gained ten pounds and his general condition, including his mental state, had improved remarkably. His complaints were that he noticed difficulty controlling his rectal sphincters during an attack of acute diarrhea from food poisoning. He also complained of dribbling of urine at the beginning and end of urination and the fact that he drained urine from a sinus opening at the junction of the perineum and scrotum. The suprapubic and perineal wounds had closed satisfactorily. I could put my index finger readily into his rectum. Because of the possibility of the opening tightening further I furnished him with some rectal dilators which he used regularly. I also began to dilate his urethra in the hopes that by so doing the fistula at the scroto-perineal angle would close spontaneously. Dilatations, however, were usually followed by attacks of epididymitis, one of which necessitated surgical drainage.

I, therefore, at a later date ligated the vas deferens on both sides and continued dilatation more vigorously. I was finally able to use a 28 French sound but the sinus persisted. For this reason, I placed the patient in the hospital again and on November 15, 1933, repaired the sinus at the scroto-perineal angle. The tract was 1.5 inches long but was not difficult to repair. I used an indwelling catheter in the urethra for four days. The wound healed satisfactorily. I saw this patient a few months ago and he is doing very well and is working every day. He has no difficulty if he keeps his stools soft and does not allow his bladder to become over-distended before voiding.

IMPALEMENT OF THE RECTUM

With Report of Two Cases of Injury to the Bladder

GILBERT COTTAM, M.D.

Impalement of the rectum was used by the ancient as a form of punishment. The oldest collection of laws in the world, the Code Hammurabi (circa 2200 B.C.) contained specific allusion to it in the following words, as translated, in 1903, by C. W. Johns: "If a man's wife on account of another male has caused her husband to be killed, that woman upon a stake one shall set her." Pennington (A Treatise on the Diseases and Injuries of the Rectum, Anus and Pelvic Colon, 1923) mentions that in ancient Rome impalement was at first restricted to slaves who had been guilty of robbery and that later on, Nero resorted to it among other measures in his persecutions of the Christians. The Ottoman Turks used it soon after their irruption into Europe, for various offenses. In the Middle Ages it was used in Russia, Germany and Austria in cases of murder and witchcraft. It is said to have been used in the Inquisition. One of the English kings, Edward II, was murdered (A.D. 1327) in Berkeley Castle by having a red-hot skewer thrust up his rectum through a cow's horn used as an obturator. Pennington, on the authority of Fairlie, states that a form of impalement is in vogue today in the Malay Peninsula as punishment for female marital infidelity. A species of bamboo which grows with extraordinary rapidity, 24 inches in 24 hours, is used and the condemned woman is lashed to stakes over this bamboo, causing impalement in two days.

Accidental impalement of the rectum as it occurs in modern life is not a very uncommon injury. It happens in a wide variety of circumstances and with greatly differing vulnerating agents, but probably the most frequently encountered type is that which takes place in agricultural communities, in the manner about to be described. Those who are interested in the other types will find detailed information in the papers of Weller Van Hook, of Chicago, whose article entitled "Rupture of the Rectum by Penetrating Bodies," with description of 58 cases collected from the literature, with one of his own included, published in *Medicine* for June, 1896, was the first contribution of the kind of any comprehensive importance to literature; of Herman Tillmans, who described 143 cases (including the vaginal type) in his article "Die Verletzungen u. Chir.

Krankheiten d. Beckens," in *Deutsche Chirurgie*, 1905, Heft 62A; and finally in that of Otto W. Madelung, of Charlottenburg, entitled: "Die Pfählungsverletzungen des Afters und des Mastdarms" in *Arch. f. klin. Chir.*, 137:1-80, 1925, which contains an enormous bibliography covering eight and a half pages of closely printed references from all over the world. While, as the titles indicate, these two German articles just referred to deal with all kinds of wounds of the rectum and anus, a considerable number of impalements will be found to be described therein and some of these are of a nature to tax credulity, if it were not that they are fully authenticated by reliable observers.

Tonight our attention will be concentrated on the variety which occurs commonly in farming conditions and in a manner so uniformly similar that one description of the way in which it takes place will fit practically all cases. A farmer riding on top of a load of hay throws a pitchfork to the ground and slides down. The tines of the pitchfork have stuck in the ground and the handle stays up; the man straddles this handle and the point strikes his perineal region and is directed into the anus, in the manner described by Van Hook. One of five things is then obliged to happen: (1) The handle may merely enter the lumen of the lower bowel and do no more harm than cause contusions, abrasions and tears of the mucous membrane and sphincters; (2) it may penetrate the wall of the rectum anteriorly and damage the tissues of the recto-vesical septum, without injuring the bladder or entering the peritoneal cavity; (3) it may penetrate the anterior wall of the rectum and injure the bladder, without entering the peritoneal cavity, as in the first case I shall describe tonight; (4) it may penetrate the anterior wall of the rectum, traverse the recto-vesical septum, enter the bladder from behind and reach the peritoneal cavity through the top of the bladder, as in my own case, the second to be described tonight, or (5) it may penetrate the anterior wall of the rectum high enough to miss the bladder and reach the peritoneal cavity direct.

The immediate effects of an injury like this, no matter how extensively the parts involved are damaged, are often surprisingly slight. There is usually very little bleeding, no shock and a minimum of pain. In some of the cases reported the patient has removed the vulnerating agent himself and walked some distance afterwards. In a case reported by G. D. Whyte in the *Edinburgh Medical Journal* of March, 1911, page 255, a Chinaman had a piece of bamboo 8 inches long and 1.5 inches in diameter pushed up his rectum. He pursued his assailants for some distance, the piece of bamboo meanwhile working up into his lower bowel so that on admission the lower end could easily be felt in the iliac region, while the upper one passed under the rib margin where it could not be defined. This initial freedom from pain, shock, et cetera, is very misleading. Lay people do not appreciate the gravity of the situation and many doctors are slow to recommend intervention until peritonitis is well on the way and the chances of recovery even with operation are greatly diminished. Consequently, the super-

stition has arisen that these cases are better left alone and not operated upon.

This undoubtedly does apply to the non-penetrating cases, that is, those in which the vulnerating agent does not enter the peritoneal cavity, for most of these do

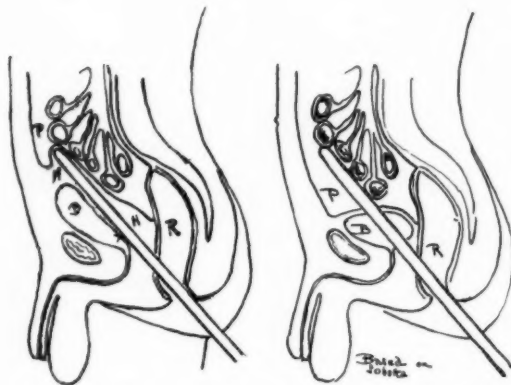


Fig. 1. (left) Dr. W. E. Morse's case. P, peritoneal cavity; H, hematoma; B, bladder; X, site of injury to bladder; R, rectum.

Fig. 2. (right) Author's case. P, peritoneal cavity; B, bladder; R, rectum.

recover under non-operative treatment, but where there is any doubt, we believe that it is safer to open the abdomen and take a look, for the odds are surely against the patient when fecal contamination of the peritoneum from the rectum occurs, or there is an open wound of the bladder into the peritoneum as well, if we sit back and do nothing but watch and wait. It is not always easy to estimate the depth of penetration in these cases. The distance of the fall before striking the vulnerating agent and the weight of the patient may afford some information, but the statement of a bystander who pulled it out is seldom reliable. The best evidence of deep penetration, if it be present, as it was in the two cases about to be described, is the ability to feel the end of the pitchfork handle, or whatever it is, through the anterior abdominal wall. In such cases we believe the indication for operation to be clear and undisputable, and as early as possible after the receipt of the injury.

I shall now describe as briefly as possible two illustrative cases with bladder involvement. Only the second is one of my own, the complete history of the first having come into my hands recently through the kindness of my friend Dr. W. E. Morse, of Rapid City, South Dakota, who handled it himself throughout.

Case 1.—Impalement of the rectum by pitchfork handle, with penetration of the anterior wall of the rectum, extraperitoneal injury of the bladder and massive retrocystic hematoma formation. Laparotomy, drainage and recovery (Dr. W. E. Morse's case).

C. W.—, Bonita Spring, South Dakota, male, aged twenty-two, while hauling hay, on July 16, 1930, threw a pitchfork to the ground from the hayrack and immediately jumped from the load of hay, landing on the pitchfork handle, the fork having stuck in the

ground. The handle of the fork entered and penetrated the rectum for a distance of about 14 inches. The end of the handle could be felt a short distance above the pubes.

Examination showed the head, neck and chest free from evidence of disease or injury. The abdomen was acutely tender over the lower half, on both sides, with well defined rigidity of both recti. Rectal examination showed contusions in the anal area; the proctoscope revealed a perforation of the anterior wall.

Laparotomy under gas-ether anesthesia was performed within a few hours after the accident. It was found that the pitchfork handle had not penetrated into the peritoneal cavity but had stripped the peritoneum from the bladder to the anterior abdominal wall, with the formation of a huge hematoma in the traumatized area (Fig. 1).

The peritoneum was closed and the retrocystic traumatized area was drained by an extraperitoneal Penrose drain protruding anteriorly. A retention catheter of the mushroom type was left in the bladder and the patient returned to bed in good condition. Two days after the operation the patient was having a discharge of fecal material and gas through the retention catheter and a large amount of liquid which appeared to be urine was coming through the rectum. Eleven days after the operation, the intervening period having been quite uneventful, the temperature was normal, the patient feeling very well, there was less air coming through the bladder, less pain on urination and less fluid coming through the rectum. On the twentieth postoperative day the patient was sitting up and feeling very well; on the following day he was discharged from the hospital under observation, the rectal examination at that time showing that the channel of communication between the bladder and rectum was narrowed down to the size of a small lead pencil. Four days later he had to be readmitted on account of weakness, abdominal discomfort and pain in the rectum, due to fecal impaction in the rectum, relieved by enemies. Dr. Morse's records do not show the date of the final observation, but whenever it was the fistula had healed completely and the patient remained well.

Case 2.—Impalement of the rectum by pitchfork handle, with penetration of the rectum anteriorly, through-and-through penetration of the bladder into the peritoneal cavity and beginning peritonitis. Laparotomy, suture of the bladder, peritoneal drainage and tube drainage of the recto-vesical injury, recovery. (Author's case.)

R. P.—, Elkton, South Dakota, male, aged sixteen, was admitted on the morning of August 27, 1922, giving the following history: about 5:45 on the previous evening the patient jumped down from a wagon and struck a hay fork stuck in the ground, receiving the impact on his perineum. The fork handle entered the rectum and the end could be felt in front, just behind the anterior abdominal wall, a little below the umbilicus. Patient's father pulled out the fork handle. The immediate disability was slight; a physician who was called ordered hot applications and especially advised against any operation. During the night the father became alarmed by the boy's restlessness and complaint of increased pain, took him to a doctor in another town. This doctor catheterized the patient, obtaining only a small amount of fluid, although there had been no micturition since the accident, and also ordered him given an enema, which was found to contain some blood. This doctor realized the possibility of serious injury and brought the patient a distance of some sixty miles to me, early in the morning following the afternoon of the accident. I noted that the patient's facial expression appeared drawn and anxious, the pulse rapid and of none too good quality, the abdomen rigid throughout without localization and the lower abdomen tender to pressure. Rectal examination showed a longi-

tudinal tear 1 inch long in the anterior wall, through which urine dribbled. Diagnosis: pitchfork handle injury of bladder through the rectum with possible intestinal injury; acute diffuse peritonitis.

Operation was begun exactly fifteen hours after the time the injury was received. Under ether the abdomen was opened through a right paramedian incision below the umbilicus. On opening the peritoneum a large amount of turbid fluid escaped and several coils of injected small intestine flaked with fibrin appeared. A transverse opening in the upper anterior wall of the bladder, in the median line, about 1 inch long, was soon found and repaired with two layers of catgut, the first of which included only the fibrous and muscular coats, the second closing and inverting the peritoneal coat (Fig. 2). A rapid exploration of the pelvis failed to disclose any intraperitoneal injury of the large or small intestines except a superficial abrasion of the small intestine at one point. A large black rubber fenestrated drainage tube was placed in the lower angle of the abdominal incision extending down into the pelvis. The rest of the abdomen was closed and the patient placed in the lithotomy position. The wound in the perineum was closed with a couple of interrupted sutures and a fairly large black rubber drainage tube placed in the wound in the rectum which was found to lead directly into the bladder and anchored externally. He recovered nicely and was discharged on the eighteenth postoperative day.

Conclusions

No one surgeon sees enough of these cases to be able to build up a series on which to form any conclusions. Most surgeons who report cases have seen only the one; so far, in a fairly extensive search of the literature I have found none who has reported more. Many surgeons of wide experience have seen none. Under these circumstances it is difficult to formulate a plan of action based on statistical study, applicable to the management of these cases. Van Hook and Tillmans, in their papers, estimate the mortality rate, by and large, at about 30 per cent. However, in Van Hook's collection of fifty-eight cases, the thirty in which penetration of the peritoneal cavity did not occur, all recovered, with or without abdominal exploration, while 71.4 of those in which such penetration did occur died. Many of these latter were cases of delayed operation or no operation, and so the figures are elusive in their significance.

I believe that the safest rule to follow is that postulated by Van Hook and other writers, that "operative measures suitable to the nature of the case should be undertaken with as much promptitude after these accidents as in cases of abdominal gunshot injury."

Discussion

DR. WALTER A. FANSLER (by invitation): I very much appreciate the privilege of discussing the papers of Drs. Cottam and McGandy. I had the opportunity of examining the patient of Dr. McGandy, and consider the result quite remarkable. He complained of a little difficulty in controlling a liquid stool or his bladder if over-distended, but I felt that even this was quite largely a mental hazard. I have seen two other cases of this type which might be briefly mentioned. In the first instance the patient, a male, was backing down a ladder on the side of a railroad car. He dropped from the last rung and his anal region struck the end of a crowbar which was sticking upright in the ground. The crowbar entered the rectum through the anal canal do-

ing but slight injury to the anal canal. The rectum was pierced through the anterior wall at a point just above the prostate, the abdominal cavity being entered just posterior to the bladder. The abdomen was opened the following day by Dr. B. J. Branton of Willmar, who removed some pieces of overalls, and other extraneous matter. The rectum was repaired, and abdominal drains inserted. The patient left the hospital in two months with all wounds healed. I saw him sixteen months later. His complaint was a feeling of being unable to control his bowel. This, however, was a sensation, not a fact. He also stated that he had noted a little blood four days previously, and that he had pain during the act of defecation. A radiograph taken six weeks previously following a barium enema, was said to have shown some adhesions posterior to the rectum, but no interference with bowel function. The barium enema was retained without difficulty. Examination revealed that the anal canal could be dilated easily and painlessly to the diameter of one inch. The tone and contractile power of the sphincter was good. One and one-half inches from the anus on the midline of the anterior rectal wall, was a scar which extended upward and slightly to the left for 1.5 inches. It was well healed and not tender, and I felt the result was excellent. I saw the patient again six months later. At this time he complained of pain in the pelvis, particularly at night after a day of bending and stooping. He stated that the left lower portion of the abdomen swelled and that the scar of his abdominal incision was tender and painful. His appetite was poor and he had gas in his intestines. The findings upon examination were unchanged, and I could not but feel that the chief cause of symptoms was the threatened loss of compensation. I felt that operative procedure would be of no benefit and advised against it. However, his abdomen was explored at a later date by a local surgeon with the report of some adhesions about the sigmoid. My last report was that no benefit had been derived from the operation and my personal feeling was that no improvement would occur until the matter of compensation was settled.

The second patient was that of a young boy, sixteen years old, who was playing football on a vacant lot, from which the weeds had been cut, leaving some rather tall stumps. In the play he was pushed backward, sat on a weed-stump, which entered the rectum through the anal canal. The rectum was pierced on the anterior wall just above the prostate. I saw him in the General Hospital, sixty hours after injury. Rectal examination revealed the injury, but he had only a slight temperature and leukocytoses. He had slight distention and tenderness over the lowermost part of the abdomen. There was no abdominal rigidity, and we felt that, since sixty hours had elapsed with no graver symptoms than those present, we were justified in waiting further. In this case we were justified, as the boy's symptoms rapidly subsided and he was discharged from the hospital within a few days.

As has been pointed out, the occurrence of impalement or other similar rectal injuries, are so infrequent and the nature of the injuries so variable, that no predetermined or routine treatment has been determined. There are, however, certain facts which are of value when we are confronted with a patient suffering from this type of injury.

First it should be remembered that an elongated object entering the rectum will usually strike the anterior wall of the rectum, rather than the posterior wall which hugs the hollow of the sacrum. If the object be sharp, it will likely perforate at the first point of contact. If perforation does not occur here then it will almost surely take place near the site of the rectosigmoid juncture. At this point there is a distinct narrowing of the bowel, and just above there is a definite angulation. This angle is in some cases so acute that even

with the greatest care a proctoscope cannot be advanced around it. Therefore this is a common site of perforation. In a few instances this narrowing and angulation does not occur, and the rectum and colon form a straight tube entering the abdominal cavity. This is undoubtedly the case in those rare instances where the end of the object causing impalement can be felt high in the abdominal cavity, and yet bowel perforation has not occurred. It is, I think, of some practical value to remember that in almost all cases of impalement the site of perforation will be not more than 6 inches from the anus and likely, less. The injury therefore should be easily visualized by the use of an anoscope or a short proctoscope. If no perforation can be found in this area the chances are that one does not exist.

In attempting to make a diagnosis the giving of enemas or the inflation of the bowel with air during proctoscopic examination should be avoided as foreign material may be forced into the peritoneal cavity. The walls of the rectum should be cleansed where necessary with moist gauze or applicators, and proctoscopic examination made without inflation.

An x-ray examination is a valuable adjunct in many of these cases for it may reveal the presence of gas in the peritoneal cavity, especially in those cases where some time has elapsed since the injury. It may also reveal the presence of foreign material.

Doctor Cottam commented upon the frequent lack of hemorrhage in these cases. This is because the majority of perforations occur on the anterior walls of the rectum in the relatively avascular area above the prostate. The blood supply of this portion of the rectum is derived almost entirely from the superior hemorrhoidal artery. This artery bifurcates upon the posterior aspect of the rectum, only its terminal branches extending anteriorly. He has also emphasized the unreliability of the statements of persons who witness the accident and the early lack of shock and other evidence of severe injury in these cases, even where perforation of the abdominal cavity has occurred.

To recapitulate all of the points brought out in these papers and their discussion, the following salient points may be kept in mind:

1. In the majority of cases the site of bowel perforation will be found on the anterior wall of the rectum, and seldom more than six inches cephalad to the anal orifice. It can therefore be easily visualized with a short anoscope or proctoscope, and if no perforation can be found in this area the chances are that one does not exist. If such an opening is found, careful probing is justifiable.
2. X-ray examination may reveal the presence of gas or foreign material in the abdominal cavity.
3. Enemas and inflation of the bowel with air are unnecessary and dangerous in cases of perforation. Proctoscopic examinations can be done without inflation and the walls of the bowel can be cleansed with moist gauze or applicators.
4. Statements of witnesses of the accident must be accepted with caution.
5. Hemorrhage, shock, severe pain, or other evidence of severe injury are frequently lacking immediately following the injury, even though perforation of the abdominal cavity has occurred. This must be kept in mind lest the surgeon be tempted to follow the policy of watchful waiting rather than making a thorough investigation.
6. Immediate exploratory laparotomy should be done in all doubtful cases. To wait for active signs of perforation is to court disaster. The exploration of a normal abdomen is not serious, but it is serious to allow a perforated bowel to go without early attention.

Dr. C. D. CREEVY: I have never seen an impalement of the rectum in which the bladder was injured. I should like to congratulate both Dr. Cottam and Dr.

McGandy on the excellent results they have had in what must have been rather difficult situations.

My experience at the University Hospital includes one instance of impalement of the rectum with a pitchfork handle which entered neither the peritoneal cavity nor the bladder. The patient made an uneventful recovery without any operative therapy. I have seen one case of puncture of the sigmoid by a proctoscope which was repaired surgically within a few minutes of the accident but which caused death, indicating the virulence of the organisms that sometimes are present in the rectum. The rest of my experience has concerned lesions of a different type involving the rectum and bladder or urethra; included are a recto-urethral fistula which had followed a hemorrhoidectomy some thirteen years before. The communication was between the bulbous urethra and the anterior rectal wall just above the anal sphincter, so that the patient was able to void urine in a good stream through the anus, the urethra being shut off by a stricture just below it. The urine was clear. When the patient understood the nature of the operations that would be required he decided to continue his urination in the manner to which he had been accustomed for thirteen years. I still think this was a wise decision.

The second was a recto-urethral fistula following perineal prostatectomy done, of course, elsewhere, and which had already been repaired by Dr. Peyton, who did preliminary colostomy and cystostomy, followed by an operation similar to that which Dr. McGandy did in his patient.

The third was a case of a congenital communication between an imperforate anus and a prostatic urethra which was repaired by Dr. Wangenstein.

The only fistulous communication between the urinary tract and the bowel which I have seen and treated personally was one which followed a series of operations for intestinal obstruction, also done elsewhere, beginning with an appendectomy, followed by drainage, followed by intestinal obstruction, followed by an operation for the relief of adhesions which, in turn, three or four days after the operation, was followed by the passage of feces and gas through the urethra. The condition had been present for about six months following the last operation when the patient was admitted to the University Hospital and the diagnosis, of course, was perfectly obvious from the symptoms. I was anxious to secure some films which could be made into a lantern slide for demonstration purposes and undertook to demonstrate the fistula by means of the x-ray. Barium given by mouth and by rectum failed to enter any fistulous communication. A cystogram was made and failed to show any communication between bladder and bowel. An opening could be seen high up on the posterior wall of the bladder with a cystoscope quite readily but nothing could be passed through it. When the abdomen was explored it was found that there was a perforation in the terminal ileum which communicated with the posterior wall of the bladder and which was very readily taken down and repaired, after which there was an uneventful recovery.

Dr. T. H. SWEETSER: I wish to mention the case of a young man whom I saw at the General Hospital in 1933, in order especially to call attention to the possible value of intravenous pyelography and cystography in cases of the type under discussion this evening. This man, during a game of horseshoes, sat between turns on a tin can placed upside down on one of the iron stakes used in the game. The bottom of the tin can bulged farther each time he sat on it, and finally gave way and the stake entered the rectum. He developed abdominal pain in both lower quadrants, especially on the left; there was no nausea or vomiting and no external bleeding. He was given a hypodermic injection and sent to the hospital, where, on examination, only a

tenderness and spasticity of the lower abdomen were found.

Exploratory laparotomy disclosed an intact peritoneum but marked edema of the tissues in the region of the rectum; no mention was made of the bladder. Four days later I was asked to see him because the urine at the time of admittance had showed blood, and later blood and pus cells. I suggested intravenous urography; I haven't heard that mentioned in the discussion thus far. There was noted thereby a mild bilateral hydronephrosis and hydro-ureter, and, more important in this case, a lack of concentration of the dye in the bladder, due apparently to leakage of urine into the surrounding tissues or into the rectum. Cystoscopy showed a wound in the base of the bladder and bits of clothing in the bladder cavity. The bladder was opened suprapubically, clothing, urine and feces removed, and the wound in the bladder base closed with a mattress suture of forty-day chromic catgut, avoiding the mucosa of bladder and rectum and pushing the knot down behind the bladder. A Freyer tube was placed for drainage. The urine, clear at first, showed some fecal contamination temporarily after three days, but cleared soon. The operative wound healed well and he voided easily and went home in excellent condition thirty-one days after his accident and twenty-six days after the cystotomy.

In this discussion, I wish mainly to call your attention to the safety and possible diagnostic value of intravenous urography in such cases.

DR. H. W. CHRISTIANSON (by invitation): I saw a case where a pitchfork tine had perforated through the rectum into the bladder. An indwelling catheter was placed in the bladder and a small drain was placed in the wound located in the rectal wall. This drain was removed in a few days and nothing further was done. The patient made a complete recovery.

One important fact might be brought out regarding the packing of these wounds. Drains or gauze packing should not be left in longer than is absolute necessary as they may produce a permanent sinus or fixed scar. This rule applies to any fistulous tract.

Accidents involving impalement of the rectum are very serious and it is, therefore, important to find out at once if the wounds are extra-peritoneal or intra-peritoneal.

DR. WILLARD WHITE: I would like to mention briefly a boy I saw at the General Hospital about 1925, as I remember. He had been playing ball and broke the bat. He put the blunt end of the bat on the ground and had a piece of board that he put across the upper or sharp end, and sat on this. Something happened so that he lost his balance, the board tipped up and the sharp end of the broken bat went into his rectum, penetrated the anterior wall of the rectum, through the posterior wall of the bladder and out through the fundus. I happened to be at the hospital on another emergency and I saw the boy about two hours after the accident, at which time there was very definite rigidity in the lower abdomen. We were satisfied that he had peritoneal irritation. We opened his abdomen and found urine and fecal material in the abdominal cavity and these perforations I mentioned.

These perforations, the two in the bladder and one in the rectum, were sutured. One point I would like to make now which I think you all know but may fail to remember and which is a very valuable thing in connection with extensive soiling such as you get in this type of thing. Pour in a great deal of normal salt solution and suck it out with the suction apparatus because it has been demonstrated with experimental animals that pathogenic organisms can be placed in the abdominal cavities of dogs and if the abdominal

cavity is washed out thoroughly immediately and closed without drainage, about 80 per cent of these dogs will survive, whereas if they do the same thing except that they do not wash out the peritoneal cavities practically all of the dogs will die. It is a very good idea to irrigate the abdominal cavity and then use the suction apparatus.

An indwelling catheter was left in this boy and he got a bilateral epididymitis. There was some infection in the abdominal wound. However, he recovered. I followed him for a number of years. Since that time he has married and has at least two children. That was of interest to me because I wondered whether or not his bilateral epididymitis was going to sterilize him.

DR. H. F. BAYARD (by invitation): All of the cases reported here this evening have resulted in a favorable outcome, in spite of the fact that, as Dr. McGandy cites, the mortality rate reaches a level of something like 30 per cent. Two of the three cases within my experience have resulted fatally.

The first of these was a man who slipped off a runway while watching concrete being poured on a construction job. He impaled himself on one of the corrugated reinforcing rods protruding up above the concrete; this rod was somewhat over an inch in diameter. The injury was a complete denudation of the perianal skin, perforation of the lateral wall of the rectum as well as perforation of two loops of ileum. Peculiarly enough, this man made a recovery.

Another case, seen in consultation, resulted in a fatality. This case, as are many of the rectal traumatic lesions, was due to perforation of the lateral wall of the rectum by the handle of a pitchfork, the end of the perforation tract being at the base of the mesentery in one of the lower loops of bowel. A large postrectal abscess developed and was drained but an adynamic ileus and peritonitis developed and the boy died, as I recall the case, about one week after exploration of his abdomen.

These are usually very serious injuries and we should not be misled into thinking that the injury carries a low mortality rate.

The meeting adjourned.

HARVEY NELSON, M.D., Secretary.

The Prevention of Paralysis in Poliomyelitis

The seasonable outbreaks of infantile paralysis are not far distant. Last week a statement in the correspondence column of THE JOURNAL emphasized the necessity for complete rest for patients in the early stages of this disease. Complete rest is so important that it is usually far better to leave the child in bed at home when the disease is first suspected than to move the patient any appreciable distance to a hospital. When these patients are disturbed or moved as little as possible a majority in whom the disease has not progressed beyond the early stages escape paralysis entirely. Should the patient have paralysis, especially of the extremities, the affected part should be immobilized properly at the earliest moment. Early rest of a weakened muscle under these circumstances will help prevent permanent crippling. Infantile paralysis can be suspected when there is fever, headache, irritability, possibly vomiting, perhaps a tremor in the hands, and especially a tender rigid spine, which makes it impossible for the child to touch his chin to his knee. When such manifestations are present, the spinal fluid may be examined to confirm the diagnosis. Thus far there is no specific effective remedy in the acute stages of infantile paralysis nor any generally accepted preventive.—(Jour. A.M.A., May 14, 1938.)

REPORTS and ANNOUNCEMENTS

MEDICAL BROADCAST

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 9:45 o'clock every Saturday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota. The program for the month will be as follows:

June 4—Chronic Illness.

June 11—Burns.

June 18—Arthritis.

June 25—Orthodontia.

HENNEPIN COUNTY MEDICAL SOCIETY

Dr. J. S. Reynolds was elected president at the annual meeting of the Hennepin County Medical Society, held May 2, 1938. Other officers elected were: Dr. W. E. Patterson, first vice president; Dr. F. J. Pratt, second vice president; Dr. L. M. Daniel, secretary-treasurer, and Dr. T. A. Peppard, librarian.

Dr. F. A. Willius, of Rochester, addressed the members on "A Less Common Manifestation of Rheumatic Heart Disease."

NORTHERN MINNESOTA MEDICAL ASSOCIATION

Announcement has been made by the program committee that the fall meeting of the Northern Minnesota Medical Association will be held at Crookston, Minnesota, on Monday and Tuesday, August 29 and 30. Further announcement as to the program will follow in a subsequent issue.

REDWOOD-BROWN COUNTY

The Redwood-Brown County Medical Society held its annual meeting at the Turner Hall in New Ulm on Wednesday, May 4. The meeting was preceded by a banquet with the Ladies Auxiliary, following which Dr. J. G. Love and Dr. Bayard Horton of the Mayo Clinic gave talks respectively on "Diagnosis and Treatment of Head Injuries," and "Histamine Treatment of Migraine Headaches."

Election of officers resulted as follows: President, Dr. Walter G. Nuessle, Springfield; vice president, Dr.

Howard Vogel, New Ulm; secretary-treasurer, Carl J. Fritsche, New Ulm; censor for three years, Dr. Francis C. Gibbons, Comfrey; delegate to 1939 convention, Dr. Cornelius A. Saffert, New Ulm; alternate, Dr. Kenneth L. Olson, Gibbon.

The Medical Economics or "Contact Committee" was unanimously re-elected: Dr. Albert Fritsche, New Ulm, Chairman; Dr. T. F. Hammermeister, New Ulm; Dr. O. J. Seifert, New Ulm; Dr. E. J. Wohlrahe, Springfield; Dr. A. P. Goblirsch, Sleepy Eye.

SOUTHWESTERN MINNESOTA SOCIETY

A highly successful interprofessional dinner meeting was sponsored by the Southwestern Minnesota Medical Society on April 28 at the Hotel Thompson in Worthington.

Eighty-five men, representing dentists, lawyers, physicians and others, were present.

District Judge Charles A. Flinn introduced the first speaker, who was Mr. James H. Hall, president of the Minnesota State Bar Association. Dr. L. M. Cruttenden of Saint Paul, secretary of the Minnesota State Dental Association, followed him. Dr. Cruttenden was introduced by Dr. C. L. Perrizo, also a dentist, of Jasper. Dr. Cruttenden reviewed the history of dentistry since the establishment, one hundred years ago, of the first dental college.

Dr. B. J. Branton of Willmar, councilor of the third district, represented the physicians on the program. Dr. C. L. Sherman of Luverne, president of the Southwestern Society and of the Southwestern Sanatorium Board and member of the State Board of Medical Examiners, introduced Dr. Branton. Dr. Branton's theme was application of the Golden Rule in the relations between physicians and all of their professional associates.

WRIGHT COUNTY MEDICAL SOCIETY

The Wright County Medical Society met at Delano on Wednesday, April 20, twenty-two doctors being present. Dr. H. M. N. Wynne and Dr. R. I. Rizer of Minneapolis spoke on "Endocrines."

The home economics class of the high school served a four course dinner for the doctors and their wives at 6:30. During the afternoon the ladies were entertained by Mrs. A. E. Phillips and Mrs. Theodore Greenfield, at Mrs. Phillips' home.

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